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GEESE.

S. Froome, Chief Poultry Adviser.

INTRODUCTION.

GEESE are essentially a sideline of farming activities, and where pasture is reasonably plentiful there is no doubt they can be made to pay if they are managed correctly. The main object of keeping them is to produce meat for the table, egg production being considered only for breeding purposes. It is generally agreed that geese are the hardiest of all classes of poultry. Disease amongst adult stock seldom occurs, probably because the birds live under healthy, natural, open air conditions. Geese live for several years and in many cases it is economically sound to keep proven breeding stock for periods up to ten or more years.

The number of geese in Western Australia on 31st March, 1949, was approximately 1,900 which suggests that the breeding of this class of table bird has not been popular in this State. That the breeding of geese has been neglected appears to be rather remarkable considering that the farmer would not be put to the expense of building a shed. Geese do not require housing and furthermore, adult geese can live almost entirely on grass, are excellent foragers and when allowed free range are quite capable of looking after themselves. Year by year more land is being laid down to pasture in the South-Western portion of the State—particularly in the irrigated areas, and it is in these districts that a flock of geese should return a reasonable profit.

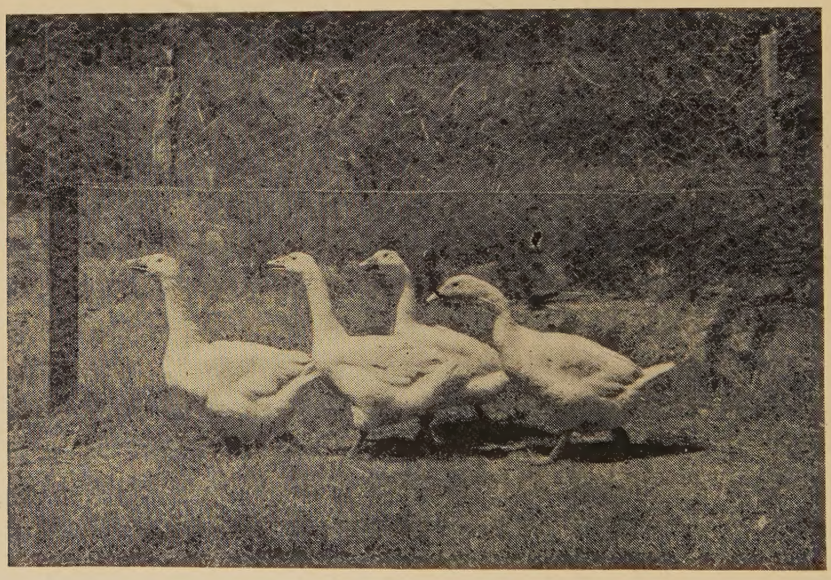
A small flock can be used to keep down the grass around farm buildings, and provided they are kept from the vegetable and flower gardens, will keep the immediate surroundings of the farm free from long grass during the winter and spring.

BREEDS IN WESTERN AUSTRALIA.

There are many breeds of geese in the different countries of the world, each country having its popular breed or breeds, but those in Western Australia are mainly Toulouse, Embden and a few Chinese. Environmental conditions partly determine the breed which should be selected for each farm; where pasture is good, Toulouse will do well, but the hardy Embden will thrive on rough, poor herbage. The following short notes on the breeds mentioned may be useful to the farmer who wishes to commence with geese:—

The Embden:

The Embden is, perhaps, the most useful variety of goose. It gives good results in most situations as it is hardy, vigorous and prolific and, as a rule, fertility, hatchability, and rearability are exceptionally good.



Embden Gander front and goose rear with their two young centre. Owned by Mr. C. Shepherd, "Dutton Park," Maddington. Western Australia. (Govt. Photographer.)

The general characteristics of the adult are:—

Head—long and straight.

Bill—fairly short, stout at base.

Eyes—bold.

Neck—long, the throat uniform with the under mandible and neck, i.e. without a gullet.

Body—broad, thick, and well rounded; broad shoulders and stern; long straight back and deep paunch: large and strong wings; close tail; carried well out.

Legs:—fairly short; large and strong shanks; straight toes connected by webb.

Carriage—upright.

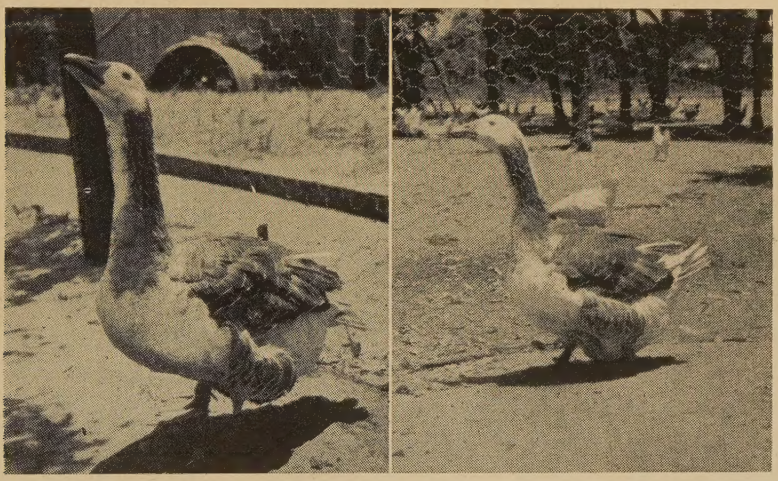
Plumage—hard and tight.

Weight—gander 30 to 34 lb.; goose, 20 to 22 lb.

Colour—bill, orange; eyes, light blue; legs and feet, bright orange; plumage, pure glossy white.

This breed matures early, the breast is well fleshed, and the colour and texture of the flesh is very good. The goose usually lays 18 to 30 eggs in the first clutch and 10 to 12 in the second laying and is a good sitter and brooder.

The gander is often used to cross with other varieties and the quality of the flesh of the progeny is thereby improved. The goslings are easy to rear and mature quickly. They do not require housing after their backs are feathered. It is general for the goslings to be grey coloured on the back down and some will carry a few grey feathers on the rump.



Good specimens of the Toulouse breed. Gander left and goose right. Note large body size. These photographs were taken on Mr. H. Stoddart's property, Stock Road, Palmyra, Western Australia.
(Govt. Photographer.)

The Toulouse:

As the name denotes, this variety is of French origin and is popular with the fancier who interests himself in breeding exhibition birds. The Toulouse is unlike the Embden in type and colour. The throat shows plenty of gullet and the body is long, wide and deep. It is not as active as the Embden and the gander should not be mated to more than three geese, but it is generally considered to be the best layer of the heavy breed geese. As a rule the Toulouse is not a good sitter, many strains show no signs of broodiness. The general characteristics of the breed are:—

Head—strong and massive.

Bill—strong, fairly short and well set in a uniform sweep from the point of the bill to the back of the skull.

Eyes—full and dark brown or hazel in colour.

Neck—long and thick, the throat well gulleted.

Body—long, broad and deep; prominent breast, deep and full; the keel straight from stern to paunch, increasing in width to the stern and forming a straight underline; broad shoulders.

Back—slightly curved from the neck to the tail; large and strong wings; somewhat short tail carried high and well spread; paunch and stern heavy and wide, with a full rising sweep to the tail.

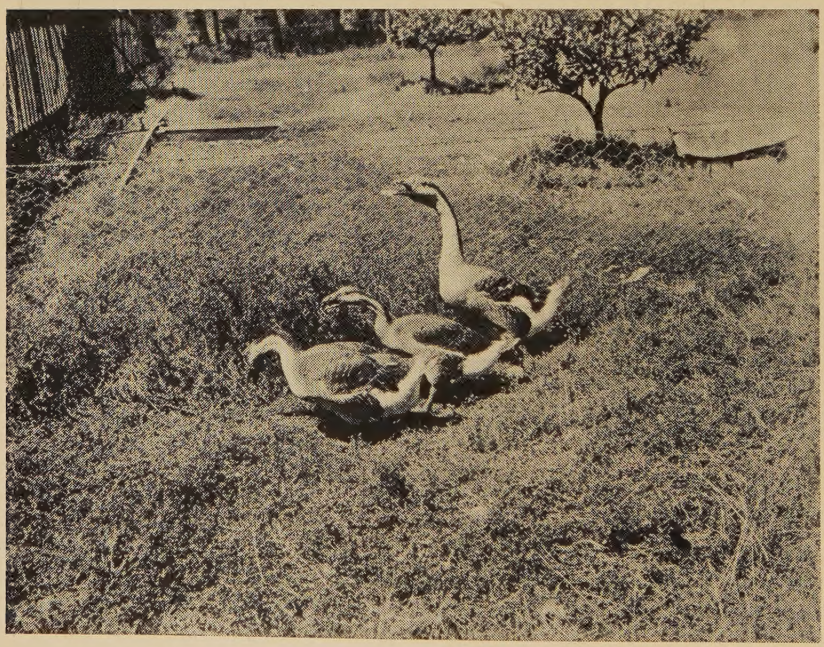
Legs—short; shanks, stout and strong boned; straight toes connected by webs.

Carriage—somewhat horizontal, not as upright in front as the Embden, and thick-set.

Plumage—full; somewhat soft.

Weight—Gander 28 to 30 lb.; goose 20 to 22 lb.

Colour—Bill, legs and feet orange; plumage—neck, dark grey; breast and keel, rather light grey shading to thighs; back, wings and thighs, dark steel grey, each feather laced with an almost white edging, the flights without white; stern, paunch and tail, white; the tail with a broad band of grey across the centre.



Chinese Geese—Gander rear, goose front and young 12 weeks old centre. Note the knobbed bill. Photograph taken on Mr. C. Shepherd's property Maddington, Western Australia.

(Govt. Photographer.)

Chinese:

The original Chinese variety is found in China, Siberia and India and its general appearance suggests a swan, especially in the neck, head, and knobbed bill. It is smaller in size than either the Toulouse or Embden, is hardy and a more prolific egg layer than the two breeds mentioned previously. It is a lover of water but appears to be quite contented and its eggs will show good fertility

without any swimming water. The Chinese goose often lays up to 60 eggs a year and mated to an active Embden gander will give many fast growing goslings which will show the deep and wide body of the Embden. The goose is a good sitter and mother, and will hatch out and rear her goslings most successfully. There are two varieties—the white has an orange bill and orange-yellow shanks. The brown variety has many shades of brown with whitish under parts and with a darker brown stripe running down the back of the neck. The bill is black or dark slate and the shanks are orange. No standard of perfection has been laid down for this breed.

AVERAGE WEIGHTS OF BREEDS.

The weights previously given for the Toulouse and Embden breeds are those required by the English Poultry Club's Standard of Perfection, but the following table approximates more closely the weights obtained in general use:—

Breed	Adult Gander	Adult Goose	Young Gander	Young Goose
Toulouse	26 lb.	20 lb.	20 lb.	16 lb.
Embden	20 lb.	18 lb.	18 lb.	16 lb.
Chinese	12 lb.	10 lb.	10 lb.	8 lb.

As geese are raised primarily for meat the breed or cross breed should be selected for its rapid growth and efficient meat production. Under Western Australian conditions it is probable that the Embden or Embden-Chinese cross would give the best results.

SELECTING AND MATING THE BREEDING GEESE.

It is not easy to distinguish the sex of geese as both sexes resemble each other closely. The following points may be helpful:—The gander has a high shrill voice, but the goose has a harsh, coarse cry; at the same age, the gander is usually larger than the goose, has a slightly longer neck and larger head.

The sex of each bird over seven months of age may be determined by examining the sexual organs. An assistant should hold the bird flat on its back. In the females, the sphineter muscle which closes the anus appears folded if stretched. In the male, slight pressure around the anus usually results in the sexual organ being protruded.

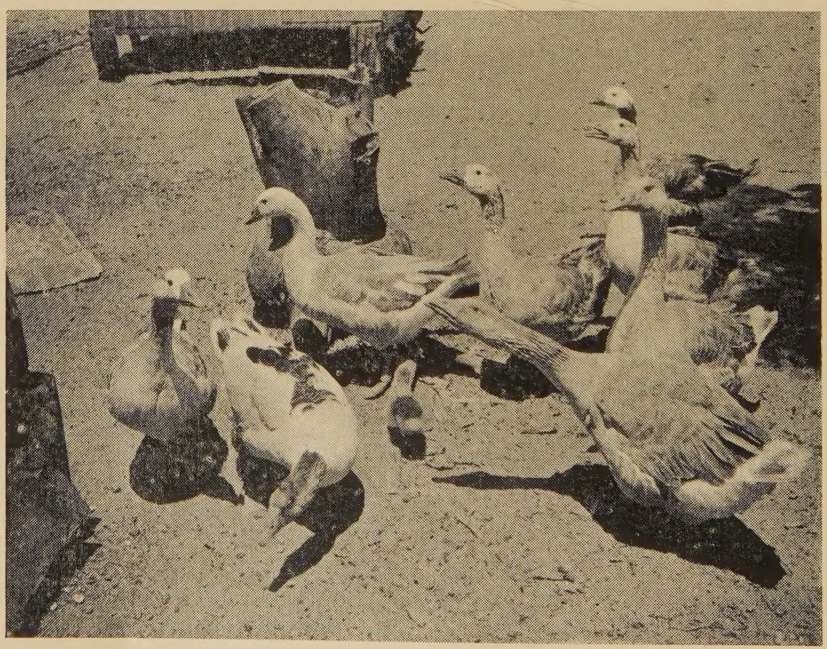
Best results are obtained when females of two years of age or more are used in the breeding pen. If younger birds are used the goslings hatched from these birds should not be kept for breeding purposes but should be marketed. Yearling ganders may be used provided they are well matured specimens of at least eight months of age. The best age for breeding is from the third to the fifth year. Females give good results for 10 years but it is not advisable to keep ganders for more than six years. The breeding stock should be selected from the progeny of breeders that are three years old or older, and as the laying season is usually short and rarely exceeds six months they should be the progeny of females which have proved good layers. The breeders should be healthy, vigorous birds, up to weight, the body long, wide and deep, not coarse in the head and with bright alert eyes. They should be handled for faults, such as, abnormal feet, roach back, and crooked keel bone.

Early selection and mating is advisable as it takes geese some time to settle down, therefore, pens should be made up in the autumn. Each pen should be kept separate during the breeding season to prevent the ganders from fighting. It is customary to run two to three females with one gander, but one gander of the Chinese breed may be successfully mated with five females.

It is possible to flockmate with geese but it requires patience and close observation. A perfectly mated flock pen can consist of either two ganders and eight females, or three ganders and 12 females. Most satisfactory flock matings are secured by bringing the sexes together while both are still in the gosling stage. It is advisable to put together more birds than will be required to allow for the culling of unsatisfactory individuals. Close observation should be made as the birds near the adult stage; it is usual to find a certain amount of fighting among the ganders. If they are fairly evenly matched no serious harm will result but if one gander obtains an undisputed mastery over the rest he should be removed and mated to two or three geese in a separate pen. Ganders which submit to bullying must be removed for they will never be given an opportunity to mate with the geese.

Females harassed by their own sex and ignored by the ganders will be noticed moping and moving about alone, and should be culled. Watch the geese at the feeding trough, the bully and the bird which habitually hangs back will be noticeable and both should be culled.

For flock mating of geese to be successful absolute harmony within the flock is required.

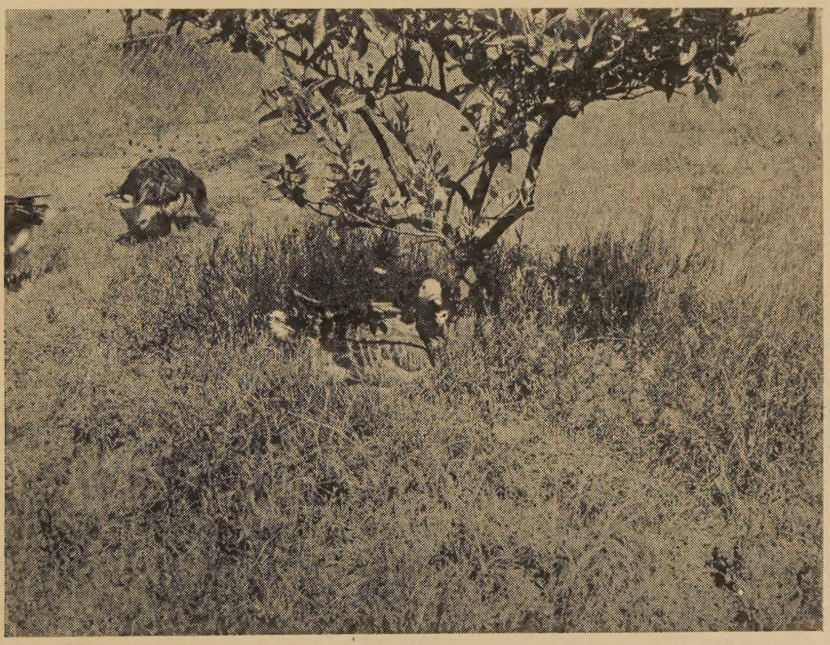


A group of Toulouse geese. The characteristic attitude of a gander protecting the geese and young (centre) is shown by the gander in the right foreground. In mating, one gander is usually allowed to every three females. The individual mating of one gander with three females is preferred but if carefully carried out (see text) flock mating can be quite successful. Two ganders are present in this flock, owned by Mr. H. Stoddart, Stock Road, Palmyra, Western Australia. (Govt. Photographer.)

HOUSING AND MANAGING THE BREEDERS.

When flock mating is not practised it is necessary to confine each breeding flock in a separate pen. The yards should be as large as possible and a fence about 3 ft. high will keep the birds confined. Prior to mating, the yards should be planted with a green crop to give the breeders as much pasture as possible. The yards should contain a number of shade trees as geese must be protected from the hot sun.

Housing does not present much of a problem. A small shed with a wire netting front, which can be closed up at night as a protection against foxes is sufficient. A cement floor above ground level must be provided to ensure dry sleeping quarters and must be covered with plenty of clean straw, shavings, or sawdust. Both goslings and geese are apt to foul their sleeping quarters, therefore the litter requires changing frequently. Nest boxes should be provided but many geese prefer to make their own nests on the litter.



A sitting Toulouse goose under natural conditions.
(Govt. Photographer.)

Eggs should be collected daily as it tends to stimulate further laying. It is not economically sound to allow a goose to incubate her own eggs. She should be used to produce as many eggs as possible during the relatively short laying season. Should a goose become broody she should be placed in a coop with a slatted floor and given plenty to eat and drink. The coop must be placed in the yard so that the goose is within sight and hearing of the other members of the breeding pen, otherwise she may not be received by them when she is liberated.

Two Toulouse geese being used as an incubator. This is a wasteful practice as the laying season for geese is a comparatively short one and they should be used to produce as many eggs as possible.

(Govt. Photographer.)

INCUBATING GOOSE EGGS.

The eggs which are gathered every day should be stored in a cool place until required. A cellar with a cement floor which can be moistened with water makes an excellent storage room. The eggs should be placed on their sides on trays and turned each day. The fresher the eggs when put down for incubation the better will be the hatch. The best results are obtained when the eggs are not more than a week old.

The incubation period with the smaller breeds of geese is about 30 days and with the larger breeds about 32 to 34 days. The eggs may be hatched under hens, muscovy ducks, or with a limited degree of success in small incubators. Whichever method is used it must be noted that the eggs require more moisture than hen eggs during the incubation period.

Most goose raisers prefer to use hens and set four to six eggs under each hen depending upon her size and the size of the eggs. A saucer shaped hollow in the ground covered with a box makes a good nest. When the broody leaves the nest for food every evening the eggs should be turned by hand as they are too heavy for the broody hen. Every day after the fifteenth day the eggs should be sprinkled with lukewarm water when they are turned. Test the eggs on the ninth day and remove all infertile ones and those containing dead embryos.

In the early part of the season it is often impossible to secure broodies and artificial incubation is necessary. The small ordinary hot air incubator will hatch out strong, sound goslings provided the eggs are not over four or five

Hens can be successfully used to hatch goslings. Usually five goose eggs are allowed each hen. Mr. H. P. Chalmer, North Lake Road, Melville, Western Australia, uses Australorp hens for this purpose.

(Govt. Photographer.)

days old. The temperature depends on the type of incubator. In the still air machines a temperature of 102° F. at the top of the eggs as they rest on the tray should be maintained for the first ten days, and after this period the temperature can be allowed to reach 103° F. Turn the eggs twice daily up to the "chipping" stage and the time taken in turning will cool the eggs sufficiently. Test eggs on the ninth day and remove all infertile and dead embryos. Provide moisture in the trays throughout the period of incubation and sprinkle the eggs with lukewarm water every day after the fifteenth day.

BROODING AND REARING GOSLINGS.

If a broody hen has been used she can be given and will mother six to eight goslings. The hen should be confined to a coop with a removable board floor for about 10 days. The coop should have a slatted front and a small run should be attached to the front of the coop. If possible, the coop and run should be placed on short grass or other succulent pasture and should be moved to a fresh patch of grass each day. Until the goslings are three weeks old they should be kept out of water and not allowed to wander in long wet grass.

If incubated by artificial methods it is necessary to provide brooding equipment. The ordinary type of brooder will suffice, maintaining the same brooder conditions as used for ducklings. The goslings should have access to a grass run and if the weather is fine can run out when they are four days old. Early hatched goslings should be protected against cold winds and will require heat for two to three weeks. Goslings hatched in the summer can do without artificial heat.

A one week old Toulouse gosling.
(Govt. Photographer.)

Goslings older than four weeks will benefit by running on a well grassed range, but if confined to a small area it must be kept clean and the sleeping quarters must have plenty of dry litter.

Goslings can be compared to ducklings as regards their shade requirements. If goslings are exposed to the hot sun in the summer time before they are feathered, many deaths will occur.

FEEDING.

Feeding Goslings:

Goslings do not require feed until they are 36 hours old when they can be given a wet mash consisting of a chick starter mash and chaffed green feed mixed with skim milk or water. As young grass and other succulent green feed comprises the major portion of the feed for goslings it is difficult to obtain data concerning their protein requirements. Day-old goslings of the Embden and Toulouse breeds weigh approximately 3 to 3.5 oz. and at four weeks of age they will average 3.5 lb. This rapid gain in weight in so short a period must be catered for and it would appear that the dry ingredients of the mash should contain approximately 18 per cent. of protein. The 16 per cent. protein mashes for chicks one to six weeks of age given in Table 10 in the leaflet "Nutritional requirements of the domestic fowl," by R. H. Morris, Department of Agriculture,* should give good growth providing the protein is increased by two per cent. The addition of 4 lb. of a 50 per cent. protein meatmeal to any of the

* Leaflet No. 995.

mashes would increase the protein content to approximately 18 per cent. Number 3 mash in Table 10 would be:—Bran 36 lb., wheatmeal 22 lb., pollard 10lb., gristed oats 10 lb., meatmeal 12 lb., dried buttermilk 4 lb., and bonemeal 1 lb. and would have a protein content of 17.78 per cent. Sufficient mash (a quantity which the goslings will consume in 15 minutes) should be fed five times a day.

In addition, they should be running out on good grass or on green crops especially planted for the purpose. If suitable pasture is not available, extra feeding of finely chopped lucerne, grass, lettuce or cabbage is advisable.

When green feed is short a Vitamin A containing oil should be included in the mash at the recommended level. For information on the use of Vitamin A refer to the leaflet mentioned previously.

Plenty of fresh clean drinking water should be supplied in containers deep enough for the goslings to immerse their heads, but arranged in such a manner that they cannot get into the containers.

Three five week old Toulouse goslings. The goslings are usually marketed when 7½ months of age.
(Govt. Photographer.)

Feeding the Growing Stock:

After the goslings are four weeks of age and if they have plenty of grass they will not require any other feed until the green feed becomes short in the summer months. Low-lying, swampy land is ideal for the growing stock in the summer if permanent pasture can be maintained, or if green crops can be planted. Geese are good grazers and on irrigated areas should find sufficient feed for most of the year. When pasture is not available growing geese should receive plenty of roughage and one feed of mash or grain daily. The roughage should form the major portion of the feed and may be cut green feed, clover or lucerne hay, fruit and vegetables, such as rape, cabbage, lucerne, green maize,

elephant grass, turnips, beetroot, apples, tomatoes, and cooked potatoes. If mash is given it should be a growing mash as fed to chickens. If grain is preferred to mash the grain must be a good quality, plump oat or a mixture of equal parts of oats, wheat and barley.

It has been estimated that, when it is necessary to feed mash or grain to growing stock, goslings from the age of six to 26 weeks will consume approximately 6 oz. of dry material per day. This amount should be considered the minimum requirement in addition to the roughage.

Reports of experiments carried out in England show that little advantage was gained by feeding concentrates to goslings throughout the growing period, provided they have free access to grazing. It was concluded that a satisfactory carcase could be produced without the use of concentrates from the age of five weeks until a month before marketing, that is, from five weeks to 26 weeks.

Feeding the Breeders:

During most of the year the breeders will secure their feed from pasture or from pasture plus supplementary feeding, but two months before the breeding season commences they will require feeding for egg production. A mash containing 15-15½ per cent. protein, as fed to laying hens, will give satisfactory results. Any of the mashes given in Table 13 of the Departmental leaflet No. 995 would be suitable and should be fed twice a day to the breeders in addition to the food they they will find in grazing. Allow 6 oz. of dry material per bird per day. Mix the mash with an equal volume of chaffed green feed and moisten the whole mixture with water until it is in a crumbly condition.

Fattening Geese:

Under normal conditions young geese nearing market stage, that is, six to seven months of age, will be in good condition. If they have been on good pasture, or on pastures and supplementary feed they are inclined to become fat. The final fattening should commence three weeks before the birds are marketed. Experiments carried out in Hungary show that the gain in weight declines after the third week and by the end of the fourth week the birds commence to lose weight.

Partly darkened fattening pens in which the geese have little room for exercise are recommended.

Three feeds of mash per day and one of green feed or chopped up vegetables should be provided. Thirty minutes after each feeding the remainder of the food should be removed. The ingredients in the mash should be mainly gristed grains and a mash containing 12½ per cent. of protein and similar to the mash used to fatten cockerels—in Leaflet No. 995—is recommended.

A suitable mash would be as follows—Gristed wheat 60 lb., gristed oats 20 lb., bran 10 lb., pollard 10 lb., and meatmeal 4 lb., moistened with water to a crumbly condition. Plenty of clean drinking water should be provided. Force feeding or noodling of geese is practised in some countries where a superior fattened goose or enormous enlargement of the liver is required. Noodles are made from gristed grains and are shaped like a large pellet about 2½ to 3 inches long. The noodles are placed one at a time in the goose's mouth and forced down the throat by pressure on the outside of the goose's neck. At the commencement of the fattening period 3 to 5 noodles are fed three times a day increasing up to 7 noodles fed five times daily. In Hungary, forced feeding experiments were carried out for a period of 28 days. In that period each bird consumed an average of 1.26 lb. of feed per day and gained 6.17 lb. in weight during the period.

MARKETING GEESE.

Early-hatched goslings can be fed to grow quickly and marketed when they are ten weeks old. The term usually applied to that class of table bird is "green geese." Most farm-raised goslings of the Embden and Toulouse breeds given proper care and feeding should weigh about 9 lb. at 10 weeks of age.

The majority of geese are marketed when they are about 7½ months of age, that is, they are allowed to graze until they are 26 weeks old and then fattened for about three weeks. The rate of growth is very rapid for the first eight weeks, but after that the gain in weight is slower, but a finished goose of the two breeds mentioned should weigh about 16 to 18 lb. when ready to market. During the fattening period and when crating for market, geese should be handled as carefully as possible to prevent the skin from being torn, or the flesh bruised, as these defects will reduce their value.

DISEASES OF GEESE.

Losses from mortality among geese are usually not so great relatively as among fowls and turkeys, probably because geese are raised in smaller units and forage widely so much of the time. The best way to prevent losses from all diseases affecting geese is to keep the breeding quarters clean and dry and move the brooding coop on to clean ground daily. Provide clean water and keep the feeding and watering utensils clean.

The diseases which may attack geese are:—

Coccidiosis:

Geese can be affected with renal coccidioses caused by *Eimeria truncata*. This parasite attacks geese of from three weeks to three months of age. This disease is very acute, lasting only two or three days and is almost always fatal. Usually the mortality in a flock is very high. The clinical signs are extreme weakness and emaciation. So far as is known, the parasite is specific to geese. Cases have occurred in Europe and in the United States of America.

Botulism:

This disease has been reported in Australia, United States, Mexico, Holland and Canada. It is a type of food-poisoning which results from ingestion of spoiled foods in which the bacterium, *Clostridium botulinum*, has been growing and producing toxins.

This organism and its toxins have been isolated from the livers of affected birds, mud, decaying vegetation and carcasses, various fly larvae, dead fish, dead grasshoppers, and grain lying in water. The incidence of the disease is closely correlated with shallow stagnant water and mud flats.

Symptoms may appear within a few hours to a day or two after the spoiled food is eaten. The most common symptom is paralysis of the leg and wing. If the neck muscles are affected the head hangs limp. The eyes are dull and partly closed, the feathers are ruffled and the bird refuses to eat. Fatally affected birds appear lifeless for several hours before death, but in mild cases the leg weakness may disappear and the birds recover in two or three days. Looseness of the feathers is often seen in botulism.

Prevention of botulism depends on feeding a wholesome ration, and preventing the birds having access to decomposed meat and vegetables. Laxatives such as castor oil or epsom salt are of value in the treatment of mildly affected cases. Birds should be dosed individually with half an ounce of castor oil, and if necessary the treatment repeated until the digestive tract is empty.

Paratyphoid of geese:

Outbreaks of this disease have occurred in Europe and America; extensive losses amongst young geese were reported in East Prussia in 1922. The birds show weakness, loss of appetite, increased desire for water, sleepiness and conjunctivitis. In outbreaks of the acute type, the mortality may reach 95 per cent. by the second to the fourth day following the onset. The disease is caused by a Paratyphoid B type organism. Eggs may be infected internally as a result of localisation of the bacilli in the ovary. At the present time there is no satisfactory means by which infected breeding birds can be detected and removed from the infected flock.

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Grateful acknowledgment is made to Mr. C. Balmer (Government Photographer) who is responsible for all the photographs which appear in this article.

COST OF FEEDING PURE BRED DAIRY COWS UNDER THE AUSTRALIAN OFFICIAL PURE BRED HERD RECORDING SCHEME IN WESTERN AUSTRALIA, 1948-49.

M. CULLITY, Superintendent of Dairying and R. A. BETTENAY, Agricultural Adviser.

THIS report deals with cost of feeding pure bred dairy cows during the 12 months up to June, 1949, and compares the findings with results of previous years as reported in earlier issues of the Journal.

The first report under this heading was published in 1924 and similar reports were issued yearly up to and including 1938-39. The collection of data was discontinued during the war years and the next report was for the year 1947-48 and appeared in the March, 1949, issue of the Journal.

The object of the investigation, which is carried out in conjunction with, and as part of, the Pure Bred Herd Recording Scheme is to determine as nearly as possible the cost of feed to produce both milk and butterfat in pure bred herds under conditions existing in this State. On the results of such an analysis of feeding costs, it is possible to make recommendatons and to show the individual farmer where his feeding practice is uneconomical.

This study is not intended to be an investigation of total cost of production and does not take into account any of the items other than feeding which help to make up cost of production—e.g. capital outlay, interest, labour, replacements, income from sale of surplus stock, etc.

The Pure Bred Herds submitted for test are located over a wide area of the South West Division, extending 60 miles north of Perth and along the Great Southern railway line as well as through the main dairying districts.

The herds are therefore held under a wide range of climatic conditions and are fed on a wide variety of feedstuffs depending upon availability and price in the particular district. In the study it has not been possible to use the price of foodstuff to the farmer actually landed on the property, and the prices used throughout are the average wholesale market prices at Perth.

As in the last report, pasture has been standardised at the constant value of 1s. 6d. per week per cow, regardless of quality. It is believed that over the year the cost of providing pasture would not exceed this figure. In reports prior to 1947-48 pasture was given two values, namely 2s. 6d. per week for good green pasture and 1s. 6d. per week for dry pasture. This alteration in valuation should be kept in mind when comparing costs of production in the post-war years with similar figures for the pre-war period. For comparative purposes it would be necessary to add in the vicinity of 1d. per gallon of milk or 2½d. per lb. of butterfat to the post war figure. The investigation is not intended in the form of a competition and to ensure anonymity, the owners' names have been replaced by a letter. Any breeder who desires to obtain the details of his own herd may do so by applying to the Department of Agriculture.

Some minor inaccuracies in the data are to be expected because of the method of collection and because the prices used in computing cost of foodstuffs consumed are average prices of the foodstuffs, but the final result should be fairly comparable between herd and herd in one year and between years when due allowance is made to the different valuation of pasture.

Table I shows the prices of the feeding stuffs which were adopted in the calculations.

TABLE I.

PRICES USED IN EVALUATING THE FOODSTUFFS CONSUMED DURING THE YEAR ENDED 30th JUNE, 1949.

	£	s.	d.
Chaff (per ton)	12	5	0
Wheat Crushed (per bushel)		8	6
Oats Crushed (per bushel)		6	3
Bran (per ton)	10	19	6
Pollard (per ton)	10	19	6
Branato (per ton)	14	10	0
Pollato (per ton)	14	10	0
Calf Meal (per ton)	20	0	0
Sweet Dairy Meal (per ton)	15	0	0
Dairy Food (per ton)	15	10	0
Linseed Meal (per ton)	18	0	0
Meat Meal (per ton)	17	7	6
Meggitts Meal (per ton)	18	0	0
Hay (per ton)	7	10	0
Silage (per ton)	1	0	0
Green Feed (per ton)	1	0	0
Lick (per ton)	18	0	0
Bone Meal (per ton)	20	0	0
Molasses (per 44 gallons)	2	15	0
Salt (per cwt.)		4	6
Pea Meal (per cwt.)		15	0
Pasture (per head, per week)		1	6

The average yearly results obtained since the commencement of the investigation are set out in the following table:—

TABLE II.

PURE BRED COWS UNDER OFFICIAL TEST—AVERAGE RESULTS OVER A PERIOD OF 18 YEARS.

Year ended 30th June.	Average Milk Yield Per Cow.	Average Butterfat Per Cow.	Average Cost of Feed Per Cow.	Average Cost of Feed to Produce 1 lb. Butterfat.	Average Cost of Feed to Produce 1 Gallon of Milk.	Average Price of Butterfat per lb. (Choice Grade.)
	Gallons.	lb.	£ s. d.	d.	d.	d.
1924	600	319.50	10 4 10	7.70	4.09	19.5
1925	652	308.59	14 13 2	10.77	6.15	17.5
1926	624	312.01	14 14 7	11.15	5.66	19.0
1927	602	290.72	14 10 5	12.00	5.79	19.0
1928	592	280.56	15 11 4	13.34	6.34	19.5
1929	629	295.10	15 1 0	12.24	5.74	20.0
1930	636	294.98	14 10 3	12.74	5.10	19.5
1931	643	301.60	9 14 7	7.74	3.64	16.0
1932	696	318.96	10 18 3	8.21	3.76	14.0
1933	664	308.60	9 2 3	7.08	3.29	11.0
1934	720	333.70	10 2 6	7.28	3.37	10.0
1935	682	326.61	9 18 0	7.34	3.49	12.5
1936	681	320.14	8 14 7	6.54	3.08	12.5
1937	685	309.31	11 5 1	8.73	3.94	14.5
1938	664	306.99	10 19 7	8.58	3.97	15.0
1939	681	310.13	10 13 7	8.26	3.76	16.0
1948	653	311.20	14 0 6	10.81	5.15	27.0
1949	655	311.17	16 16 2	13.11	6.17	31.0

It will be seen that there has been a further increase over the 1948 cost of production, amounting to 2.3 pence per lb. of butterfat and approximately one penny per gallon for milk. During the same period the price of butterfat has increased by fourpence per lb. The increased price paid for butterfat has also to offset all other increased costs and should not be taken as suggesting a greater margin of profits to the dairy farmer.

Average yields per cow, both of milk and butterfat, have remained remarkably constant over the last two years so that the increased cost of production of milk and butterfat shown here, has been brought about entirely by an increase in average cost of feed per cow.

As in previous reports, a comparision of efficiency of breeds as producers of both milk and butterfat, has been made. Results of the three breeds officially tested in the year 1948-1949 are shown in Table III.

TABLE III.

BREEDS COMPARED AS PRODUCERS OF MILK AND BUTTERFAT.

Breed.	Average Milk per Cow during Nine Months.	Average Test.	Average Butterfat per Cow during Nine Months.	Average Cost of Feed per Cow.	Average Cost of Feed to Produce 1 Gallon of Milk.	Average Cost of Feed to Produce 1 lb. of Butterfat.
A.I.S.—	lb.	%	lb.	£ s. d.	d.	d.
9 Herds	7,006	3.94	276.31	19 18 10	6.83	17.32
Guernsey—						
11 Herds	6,681	5.11	341.84	17 8 7	6.03	12.23
Jersey—						
21 Herds	6,010	5.27	321.23	13 5 6	5.30	9.93

It will be noticed that on this occasion the Jersey breed has the lowest cost of feed for producing both milk and butterfat and that the Australian Illawarra Shorthorn has the highest cost for both. A rather similar finding resulted from the previous year's survey, although the A.I.S. then had a slightly lower cost of production of milk than the Guernsey. Cost of production of butterfat occupied the same relative position in both years.

The findings in these two years are at variance with those of pre-war years when the Jersey was the most successful in obtaining the lowest cost of feeding for butterfat and the Australian Illawarra Shorthorn had the lowest costs of production of milk. The increased costs of production of milk in the case of the Australian Illawarra Shorthorn appears to be brought about by a decreased average production of milk from the tested cows of this breed.

In considering the relative suitability of breeds of dairy cattle, however, other factors have to be taken into account in addition to production of milk and butterfat, and it should also be remembered that there are high producing strains in each breed. The figures show that the Australian Illawarra Shorthorn has slightly greater milk production but does not produce as much butterfat as the Jersey and Guernsey breeds.

No attempt is made here to recommend any breed and the figures should be considered in conjunction with other advantages and disadvantages of the various breeds.

The relative cost of producing milk or butterfat in the heavy rainfall, or recognised dairying districts compared to the lighter rainfall areas in the North and East is shown in Table IV.

TABLE IV.

COST IN LIGHT RAINFALL AREAS COMPARED WITH SOUTH-WEST.

	Average Production per Cow.		Cost of Feed for—	
	Milk.	Butterfat.	1 Gallon Milk.	1 lb. Butterfat.
Dry Areas (8 Herds)	6,656	289.53	8.36	19.56
Wet Areas (33 Herds)	6,626	360.44	5.22	9.60

It will be seen that in the year under review, cost of feeding both for milk and butterfat was much greater in the dry areas. This has been the general finding over the years although in the preceeding year 1947-48, costs were much more comparable for the two regions largely as a result of the much higher production per cow during that year in the dry areas.

In interpreting these figures it should be kept in mind that the cost of feedstuffs used in the calculations was the wholesale market price at Perth and that many of the cows in the dry areas would have been fed largely on locally-grown foodstuffs obtained at less than the ruling price in Perth.

In Table V the herds are placed in order of merit as profitable producers of butterfat. Average cost of feed to produce 1 lb. of butterfat was 13.11 pence compared to 10.81 pence in the previous year. More interesting and significant than the average cost, however, is the extremely wide variation which occurs, one farm producing at the foodstuffs cost of 4.58 per cent. per lb. and another at the very high figure of 35.17 pence per lb.

TABLE V.

HERDS IN ORDER OF MERIT AS PROFITABLE BUTTERFAT PRODUCERS.

	Herd.	District Wet or Dry.	Breed.	Average Butterfat per Cow for Nine Months.	Available Skim Milk per Cow.	Value of Butterfat at 2s. 7d. per lb.	Value of Skim Milk at 2d. per Gallon.	Gross Return from Butterfat and Skim Milk.	Cost of Feed per Cow for Nine Months.	Profit per Cow.	Cost of Feed to Produce 1 lb. of Butterfat.
						£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	
1	BJ	Wet	Guernsey	462·15	5,679	59 13 6	4 14 8	64 8 2	8 16 3	55 11 11	4·58
2	H	Wet	Jersey	287·82	3,093	37 4 0	2 11 6	39 15 6	7 3 3	32 9 3	5·97
3	E	Wet	Jersey	425·61	6,234	55 0 6	5 3 10	60 4 4	11 10 7	48 13 9	6·50
4	V	Wet	Jersey	242·37	2,310	31 6 5	1 18 6	33 4 11	7 1 0	26 3 11	6·99
5	AC	Wet	A.I.S.	278·19	4,911	35 18 2	4 1 4	39 19 6	8 15 6	31 4 0	7·57
6	BE	Wet	Jersey	376·11	4,572	48 11 4	3 16 2	52 7 6	12 2 3	40 5 3	7·73
7	B	Wet	A.I.S.	242·28	3,714	31 6 5	3 1 10	34 8 3	8 17 9	25 10 6	8·81
8	BG	Wet	Guernsey	273·51	3,189	35 7 10	2 13 2	38 1 0	10 8 6	27 12 6	9·13
9	W	Wet	Jersey	330·93	3,876	42 15 1	3 4 8	47 19 9	12 14 3	35 5 6	9.21
10	AJ	Wet	Jersey	183·15	1,268	23 12 9	1 1 2	24 13 11	7 5 6	17 8 5	9·54
11	BI	Wet	Guernsey	281·97	3,473	36 8 6	2 17 10	39 6 4	11 12 1	27 14 3	9·87
12	BC	Wet	Jersey	285·48	5,398	36 17 6	4 10 0	41 7 6	12 1 6	29 6 0	10·16
13	BB	Wet	Jersey	279·72	3,046	36 3 4	2 10 10	38 14 2	13 13 9	25 0 5	11·37
14	AE	Wet	Guernsey	240·75	2,331	31 2 7	1 18 10	33 1 5	12 9 0	20 12 5	12·39
15	Q	Wet	Jersey	229·86	1,896	28 14 2	1 11 8	30 5 10	10 18 10	19 7 0	11·42
16	AN	Wet	Jersey	346·59	4,042	41 16 5	3 7 4	48 3 9	17 12 9	30 11 0	12·20
17	BF	Wet	Jersey	349·29	3,467	45 2 10	2 17 10	48 0 8	18 8 1	29 12 7	12·66
18	AR	Dry	Jersey	504·36	5,970	65 3 3	4 19 6	70 2 9	26 17 1	43 5 8	12·79
19	BA	Wet	A.I.S.	365·94	6,284	47 5 6	5 4 4	52 9 10	19 18 5	32 11 5	13·06
20	AF	Wet	Jersey	355·41	4,531	45 18 4	3 15 6	49 13 10	19 12 3	30 1 7	13·26
21	K	Wet	Guernsey	300·96	3,732	38 17 7	3 2 2	41 19 9	14 11 9	27 8 0	13·29
22	U	Wet	Guernsey	381·42	4,303	49 4 3	3 11 8	52 15 11	21 11 3	31 4 8	13·58
23	BD	Wet	Jersey	347·04	3,942	44 16 5	3 5 8	48 2 1	19 17 11	28 4 2	13·76
24	S	Wet	Jersey	307·80	3,318	39 15 8	2 15 4	42 11 0	18 7 6	24 3 6	14·31
25	AH	Wet	Jersey	406·53	5,217	52 10 1	4 7 1	56 17 2	28 17 0	28 0 2	14·56
26	C	Dry	Jersey	421·56	4,474	54 8 10	3 14 6	58 3 4	27 8 9	30 14 7	15·60
27	AQ	Wet	Jersey	278·64	2,704	36 0 9	2 5 0	38 5 9	18 4 0	20 1 9	15·66
28	AB	Wet	Jersey	256·03	2,805	33 1 4	2 6 10	35 8 2	17 14 0	17 14 2	16·59
29	R	Wet	Guernsey	339·75	4,875	43 18 4	4 1 0	47 19 4	23 11 9	24 7 7	16·65
30	N	Dry	Guernsey	395·91	5,349	51 3 0	4 9 2	55 12 2	27 10 10	28 1 4	16·67
31	AD	Wet	A.I.S.	342·45	5,549	44 4 9	4 12 6	48 17 3	24 1 11	24 15 4	16·91
32	AI	Wet	A.I.S.	299·88	5,943	38 15 0	4 19 0	43 14 0	24 1 8	19 12 4	19·27
33	M	Wet	Guernsey	391·41	4,728	50 11 6	3 18 10	54 10 4	31 18 3	22 12 1	19·59
34	F	Wet	A.I.S.	298·35	4,523	38 11 1	3 15 4	42 6 5	24 18 9	17 7 8	20.01
35	G	Dry	Jersey	323·28	3,403	43 15 8	2 16 8	46 12 4	28 6 6	18 5 10	22·08
36	Z	Dry	A.I.S.	312·12	4,629	40 6 0	3 17 2	44 3 4	27 12 10	16 10 6	21·26
37	BH	Wet	Guernsey	246·91	2,660	31 18 1	2 4 4	34 2 5	22 10 4	11 12 1	21·89
38	X	Dry	A.I.S.	245·52	4,442	31 15 6	3 14 0	35 9 6	22 15 1	12 14 5	22·20
39	L	Dry	Jersey	297·18	2,834	38 8 9	2 7 2	40 15 11	31 4 0	9 11 11	25·58
40	T	Wet	Guernsey	296·28	3,697	38 5 11	3 1 8	41 7 7	32 10 9	8 16 10	26·38
41	AK	Dry	A.I.S.	238·59	4,998	30 17 5	4 3 4	35 0 9	35 0 7	0 0 2	35·17
			Average	311·17	4,083	41 2 9	3 4 1	44 13 3	16 16 2	27 17 3	13·11

Profit per cow, which is perhaps a better measure of the economics of butterfat production, is dependent upon both cost of feed to produce 1 lb. of butterfat and upon butterfat production per cow. Greater feeding results in greater production of milk and butterfat, but each additional pound concentrates fed results in a decreased margin over the previous production. Hence a level is reached when the cost of the additional feed is not offset by the increased production and the level of feeding becomes uneconomically high. The aim of every farmer should be to feed at the level where any additional feed does not give an equivalent monetary return.

TABLE V (*a*).

COST PER COW AND PROFIT PER COW UNDER BUTTERFAT PRODUCTION.

Herd.	Cost of Feed per Cow.	Profit per Cow.	Average Profit per Cow.	Per cent. showing Profit per Cow greater than £20.
	£ s. d.	£ s. d.	£ s. d.	%
V	7 1 0	26 3 11		
H	7 3 3	32 9 3		
AJ	7 5 6	17 8 5		
AC	8 15 6	31 4 0		
BJ	8 16 3	55 11 11	31 3 5	80
B	8 17 9	25 10 6		
Q	10 8 6	27 12 6		
BG	10 18 10	19 7 0		
E	11 10 7	48 13 9		
BI	11 12 1	27 14 3		
BC	12 1 6	29 6 5		
BE	12 2 3	40 5 3		
AE	12 9 0	20 12 5		
W	12 14 3	35 5 6		
BB	13 13 9	20 0 5	26 10 8	90
K	14 11 9	27 8 0		
AN	17 12 9	30 11 0		
AB	17 14 0	17 14 2		
AQ	18 4 0	20 1 9		
S	18 7 6	24 3 6		
BF	18 8 1	29 12 7		
AF	19 12 3	30 1 7		
BD	19 17 11	28 4 2		
BA	19 18 5	32 11 5		
U	21 11 3	31 4 8		
BH	22 10 4	11 12 1	25 2 5	70
X	22 15 1	12 14 5		
R	23 11 9	24 7 7		
AI	24 1 8	19 12 4		
AD	24 1 11	31 4 8		
F	24 18 9	17 7 8		
AR	26 17 1	43 5 8		
C	27 8 9	30 14 7		
N	27 10 10	28 1 4		
Z	27 12 10	16 10 6		
G	28 6 6	18 5 10	20 6 1	45
AH	28 17 0	28 0 2		
L	31 4 0	9 11 11		
M	31 18 3	22 12 1		
T	32 10 9	8 16 10		
AK	35 0 7	0 0 2		

In an endeavour to ascertain approximately where this level is, part of the information in Table V has been re-arranged in Table V (a) in which herds are set down in ascendng order according to feed cost per cow, together with corresponding profit per cow.

Lines drawn across the table divide the herds into three groups of ten and a fourth group of 11, the top group having lowest cost of feed per cow and the bottom group having highest cost of feed per cow. The average profit per cow in each section is shown in an additional column, as is the percentage of herds having an average profit of £20 or more per cow.

TABLE VI.

HERDS IN ORDER OF MERIT AS PROFITABLE MILK PRODUCERS.

Place.	Herd.	Breed.	Average Milk per Cow for Nine Months.	Value of Whole Milk at 1s. 9d. per Gallon.	Cost of Feed per Cow for Nine Months.	Profit per Cow.	Cost of Feed to Produce 1 Gallon of Milk.
			lb.	£ s. d.	£ s. d.	£ s. d.	d.
1	BJ	Guernsey	7,632	66 15 3	8 16 3	57 19 0	2.75
2	H	Jersey	5,549	48 11 3	7 3 3	41 8 0	3.1
3	AC	A.I.S.	6,443	56 7 0	8 15 6	47 11 6	3.27
4	E	Jersey	7,827	68 10 3	11 10 7	56 19 8	3.4
5	B	A.I.S.	6,147	53 16 3	8 17 9	44 18 6	3.43
6	V	Jersey	4,676	40 19 0	7 1 0	33 18 0	3.66
7	BE	Jersey	7,015	61 8 6	12 2 3	49 6 3	4.14
8	BG	Guernsey	5,927	51 17 9	10 8 6	41 9 3	4.21
9	BC	Jersey	5,806	50 16 9	12 1 6	38 15 3	4.98
10	BI	Guernsey	5,540	48 9 6	11 12 1	36 17 5	5.06
11	AJ	Jersey	3,393	29 3 3	7 5 6	21 17 9	5.15
12	BA	A.I.S.	8,627	75 10 3	19 8 5	56 1 10	5.4
13	K	Guernsey	6,161	53 18 0	14 11 9	39 6 3	5.68
14	AH	Jersey	7,729	67 12 9	28 17 0	38 15 9	5.86
15	Q	Jersey	4,336	37 19 6	10 18 2	27 1 4	6.0
16	W	Jersey	6,182	54 1 6	12 14 3	41 7 3	6.23
17	AE	Guernsey	4,738	41 9 6	12 9 0	29 0 6	6.30
18	BB	Jersey	5,153	45 1 3	13 13 9	31 7 6	6.37
19	AF	Jersey	7,136	62 9 6	19 12 3	42 17 3	6.5
20	AN	Jersey	6,424	56 3 6	17 12 9	38 10 9	6.6
21	AD	A.I.S.	8,257	72 5 6	24 1 11	48 3 7	7.0
22	AI	A.I.S.	8,204	71 15 0	24 1 8	47 13 4	7.05
23	BD	Jersey	6,587	57 13 3	19 17 11	37 15 4	7.2
24	AR	Jersey	8,657	75 15 6	26 17 1	48 18 5	7.4
25	U	Guernsey	6,743	58 19 6	21 11 3	37 8 3	7.52
26	BF	Jersey	5,785	50 13 3	18 8 1	32 5 2	7.7
27	S	Jersey	5,619	49 3 6	18 7 6	30 16 0	7.84
28	X	A.I.S.	6,914	60 9 3	22 15 1	37 14 2	7.9
29	N	Guernsey	8,030	70 5 6	27 10 10	42 14 8	8.23
30	R	Guernsey	6,850	59 18 9	23 11 9	36 7 0	8.26
31	F	A.I.S.	7,050	61 13 9	24 18 9	36 15 0	8.3
32	AB	Jersey	5,082	44 9 0	17 14 0	26 15 0	8.3
33	AQ	Jersey	5,239	45 17 0	18 4 0	27 13 0	8.3
34	C	Jersey	7,134	62 7 9	27 8 9	34 19 0	9.2
35	Z	A.I.S.	6,960	60 18 0	27 12 10	33 5 2	9.5
36	BH	Guernsey	5,155	45 3 0	22 10 4	22 12 8	10.5
37	M	Guernsey	7,186	62 18 3	31 18 3	31 0 0	10.6
38	G	Jersey	5,986	52 8 3	28 6 6	24 1 9	11.3
39	T	Guernsey	6,181	54 1 6	32 10 9	21 10 9	12.6
40	L	Jersey	5,121	44 16 0	31 4 0	13 12 0	14.6
41	AK	A.I.S.	5,643	49 7 0	35 0 7	14 6 5	14.9
Average (lb.)	....	....	6,550	55 13 1	16 16 2	38 16 11	6.17

It will be seen that the profit per cow is greater in herds with low feeding costs on the average, although there is a number of herds with low feeding costs and small profits and also a number with high feeding costs and good profits per cow.

This finding should not be taken to indicate that high levels of feeding are not profitable, so long as the herd is one that is capable, through good breeding and sound management in other directions, of giving good production figures. It should be taken to indicate that home grown foodstuffs and pasture should be utilised to the fullest possible extent, thus greatly reducing the necessity for the more expensive concentrates. Only 35 per cent. of the herds with food costs per cow of more than £20 had above average profits per cow and it would appear desirable to keep food costs down at least to a figure of this order in a herd producing butterfat in all but exceptional circumstances.

Table VI is rather similar to Table V and lists the herds in order of merit as profitable producers of milk. Average profit per cow under whole milk production is £38 16s. 11d. compared with £27 17s. 3d. under butterfat production. Obviously in such circumstances a greater feeding of concentrates would be economically profitable. The breed order is not materially altered dependent upon whether milk or butterfat production is required, and it appears that Guernsey and Jersey breeds which top the order of merit for profitable milk production, can be quite profitable in a milk-producing area.

This result differs slightly from that found in the previous year when A.I.S. showed up in a more favourable light as producers of milk.

The publication of this analysis of feeding costs and profit per cow is to help breeders in an analysis of their feeding methods and to focus attention on pasture and the home grown fodder as the cheapest and best sources of supply. Only by concentration on these can food costs be kept at the low level so desirable to ensure a satisfactory margin of profit above costs.

VETCH CULTIVATION IN THE WHEATBELT.

By E. R. Watson, Plant Geneticist.

INTRODUCTION.

FOR a number of years the Department of Agriculture in connection with its plant breeding activities has pursued a policy of the introduction of grasses and legumes. These have been introduced from other parts of Australia and other countries in an endeavour to find pasture plants which will be suitable for local conditions. Although attention has been given to grasses such as Wimmera rye grass the emphasis has been placed on the introduction of leguminous plants because of their excellent nutritive value and the added advantage of their ability to raise the level of soil fertility.

Within recent years field peas have been used to an increasing extent especially in areas such as the Avon Valley where the soil fertility has been depleted by many years of cropping combined with the practice of cutting heavy hay crops which have been sold off the farm. Field peas although generally satisfactory have a number of disadvantages. Firstly they suffer seriously from the depredations of the pea weevil (Bruchus pisorum) and also the red legged earth mite (H. destructor). The latter can quite often result in the complete defoliation and death of a young crop while the former pest can cause such damage as to make the growing of this crop for grain an uneconomical proposition.

Although the strain of vetches, more commonly known as Golden Tares, have been grown extensively in other countries, more especially in England, they have proved to be of little value in this State. This has been due mainly to their relatively late maturity and their prostrate growth habit. The latter characteristic prevents them being harvested by normal harvesting equipment and thus limits their value.

In 1945 a number of strains of vetch were introduced by this Department from the Hawkesbury Agricultural College in New South Wales. Some of them had previously been imported by the Department of Agriculture in that State but none of them had shown to particular advantage under the soil and climatic conditions at Hawkesbury. The various strains were grown firstly at the Avondale Research Station, Beverley, where several of them appeared to be promising types. One in particular which had been designated by the registration number P4059 showed to advantage and the seed of this strain was bulked in 1946 for further trial. The 170 lb. of seed obtained was used to plant a 5-acre plot at Wongan Hills Research Station during the 1947 season, the seeding rate used being approximately half a bushel per acre. The resultant crop yielded just over 34 bushels and little difficulty was experienced in harvesting; the ordinary header harvester equipped with light iron crop lifters and with every other tooth taken out of the comb was used.

A further bulk crop grown in 1948 yielded in the vicinity of 12 bushels per acre and small quantities (bushel lots) of seed were made available to a number of farmers for sowing in 1949. Unfortunately the bulk crop at Wongan Hills in 1949 was practically a total failure. Due to the unfavourable seasonal conditions and a particularly heavy infestation of red legged earth mite the young plants did not recover sufficiently to warrant harvesting. A small nucleus plot has been sown again this year and the seed will be bulked as rapidly as possible. It is not considered, however, that seed will be available for distribution to farmers for at least another two years.

In the meantime farmers are advised against buying large quantities of seed of the commercial strains of Golden Tares under the mistaken impression that they are the same or similar to the Departmental strain. The seed is costly and the experience has been that these strains are quite unsuited to wheatbelt conditions in this State.

NOMENCLATURE.

The strain designated P4059 was introduced from Hawkesbury College under the classification of Vicia eurillia. It had been imported under this name and orginated in Malta where it was locally known as "Bitter Vetch." The latter name suggests unpalatability but feeding tests with both the green plant and

grain indicate that it is not characteristic of this strain when grown in this State. It has been decided that in view of its origin it be given the name of Malta and it will be referred to by this name in any future literature.

So far as the classification is concerned the Government Botanist (C. A. Gardner) is of the opinion that this strain is more correctly classified as one of the numerous strains of Vicia sativa. He is not familar with any species classified as eurillia and suggests that the name possibly arose in error from the name ervillia, a further species of vetch.

SOIL PREPARATION.

The results of the few years in which the crop has been grown on the Research Stations would indicate that these vetches are best sown on land which has been well prepared to ensure good weed and insect control. They do not make very rapid early growth and being a relatively short plant may become choked out by weeds in the early stages. Once they begin to make more rapid growth in spring, however, they have a blanketing effect on weeds and are more competitive.

CLIMATE AND SOIL TYPES.

It would appear that this strain of vetch is more suited to the lighter soil types of reasonable fertility. It grows well on heavier soil types provided the rainfall is sufficient. As an illustration of this in 1948 Malta vetch grew and yielded well on heavy York gum country at the Avondale Research Station, Beverley, but failed to make satisfactory growth on heavy country at the Merredin Research Station. The same year the bulk crop at Wongan Hills Light Land Research Station yielded very well.

At this stage it is not possible to define the limits of climatic and soil zones in which Malta vetch will be successful. Some idea of its limitations however, may be gained from the fact that it is approximately equal in maturity to Dun field peas or about one week later maturing than White Brunswick field peas. It would appear then that Malta vetches will be of value on light lands of reasonable fertility with an average annual rainfall of 13-14 inches or more but should only be sown on heavier soil types where the rainfall is in the region of 15–16 inches per year.

SEEDING.

The normal methods and implements used for planting cereal and pea crops can be utilized and the usual dressings of superphosphate are recommended. Although there is little information regarding the correct rate of seeding, sowing at the rate of approximately 30 lb. (½ bushel) per acre has given very satisfactory results. As with other legumes it is desirable that the seed be inoculated with the appropriate strain of nitrogen fixing bacteria, which is available from this Department for a small charge.

As a guide it is suggested that for the best results vetches be planted at approximately the same time as the midseason maturing wheats, although it is again stressed that good weed control is advisable. They should not however be planted any later than the early maturing wheats.

HARVESTING

As mentioned previously Malta vetch is an erect growing type and can be harvested with ordinary harvesting machinery. At the Wongan Hills Research Station a header harvester equipped with light iron crop lifters and with every

other tooth taken out of the comb has been used with considerable success. Possibly a pea attachment for the header could be used to advantage although it is doubtful whether this is warranted. If a stripper is used crop lifters would probably be essential.

One farmer who received a half bushel of seed in 1949 reported that he harvested his crop as follows:—

"The crop was cut with the binder when the most mature pods were on the point of splitting. Owing to rain and heavy winds the crop was almost flat on the ground but approximately 80 per cent. was picked up. The strings were then cut and the sheaves dried out in windrows. The thrashing was done with a stripper delivering straw on to the broad elevator using only the peg drum for threshing."

By this method the farmer concerned obtained 10 bushels of clean seed from the half acre harvested.

Disadvantages of the strain are that its pods mature unevenly and that it sheds its grain very readily if left standing once the pods have ripened. To obtain the maximum yields, therefore is a matter of judgment but it is advisable to harvest when the bulk but not all of the pods have matured. This will result in some immature seed being harvested and it will be necessary to make sure that the harvested seed is reasonably dry before stacking.

So far as yielding ability is concerned there is little comparative data available. The results of bulk crops on the Research Stations, however, have indicated that with reasonable climatic conditions Malta vetch is capable of yielding in the vicinity of 12-15 bushels per acre. This figure may be somewhat higher on the heavier soil types of the higher rainfall areas.

INSECT PESTS AND CONTROL.

Red Legged Earth Mite.—This strain of vetch has a considerable degree of resistance to the attacks of red legged earth mite (H. destructor) as compared with field peas. It is not immune but it appears to suffer only from very heavy infestations of the pest. The red legged earth mite can be controlled by applications of 2 per cent. D.D.T. dust at the rate of approximately 15-20 lb. per acre in the very early growth stages of the plants.

The optimum time for dusting is just prior to emergence of the young plants or just at emergence. It is in this very young stage that they can suffer such damage from red legged earth mite as to make their recovery improbable.

It may be argued that dusting of field crops is uneconomical. It is however used extensively with linseed crops and there appears to be little reason why it cannot be utilised more extensively with other crops which suffer from the depredations of insects which are controllable by D.D.T. Vetch seed is expensive and at present prices, mechanical dusting at approximately 15s. per acre is only equivalent to the value of less than half a bushel of vetch seed. Actually dusting can quite often be the difference between a total failure and a 12-15 bushel crop. Another factor to be considered when estimating the value of a good healthy crop, is the increase in soil fertility. This is not easily calculated but is nevertheless of considerable importance.

Pea Weevil.—Unlike field peas this particular strain of vetch has an immunity to pea weevil (Bruchus pisorum). This characteristic is of great importance in those areas where attacks of this insect are so serious as to make the harvesting of field peas for grain practically impossible.

NUTRITIVE VALUE.

The Animal Nutrition Officer of this Department (Dr. L. C. Snook) has reported on the nutritive value of this vetch which compares very favourably with similar legumes (1947) as illustrated in Table I which is reproduced from his article. He has also pointed out that the seed of some vetches contains dangerous amounts of cyanogenic glucosides from which prussic acid can be liberated. The quantity of this toxic substance in seed of the strain under review was found to be insignificant with no possibility of any poisoning effect occurring. There was also no indication of the green plant possessing any toxic properties.

GRAZING CAPACITY.

Unfortunately the limited amount of seed available has prevented any grazing trials being conducted with this vetch. The growing plant is, however, very palatable to stock and indications are that it may have a valuable grazing capacity. It is anticipated that when sufficient supplies of seed are available trials will be conducted to determine this capacity both alone and in association with cereals. The grain, although at first unattractive to stock, is readily eaten once they have become used to it.

OTHER STRAINS.

Various other strains of vetch have been under trial both by this Department and the C.S.I.R.O. Plant Introduction staff in this State. Although several strains have shown to advantage under high rainfall conditions they are generally too late maturing for the majority of the wheatbelt areas. One strain in particular (Vicia articulata) is interesting in that it appears to be immune to the attacks of red legged earth mite even under the heaviest of infestations. It also holds its grain particularly well and matures more evenly than Malta. Unfortunately it is too late maturing for general wheatbelt cultivation.

Other strains also have characteristics of importance and it is anticipated that a breeding programme will be commenced in an endeavour to produce varieties which incorporate the more useful characteristics of the various strains.

TABLE I.

LEGUMINOUS SEEDS.

Average Composition when Grown in Western Australia.

	Crude Protein Nx 6·25.	Fat (Ether Extract).	Crude Fibre.	Carbo-Hydrate (N free Extract).	Ash.	Calcium.	Phos-phorus.
Malta Vetch	30·2	1·2	3·8	62·4	2·4	0·11	0·27
Vicia sativa P4059							
Vicia articulata	31·8	1·1	3·4	60·1	3·6	0·12	0·47
White Brunswick Pea	23·6	1·7	5·8	65·7	3·2	0·07	0·40
P. Arvense							
W.A. Blue Lupin	34·0	2·5	19·5	40·8	3·2	0·16	0·39
L. varius							
Wheat grain	11·0	1·5	2·0	84·0	1·5	0·04	0·24

REFERENCES.

Snook, L. C.: "Locally Grown Leguminous Seeds," Journ. of Agric. of W.A., Vol. XXIV, pp. 300-312.

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BACON CARCASE COMPETITION 1949.

R. A. PAUL, B.Sc. (Agric.), Assistant Superintendent of Dairying.

THE above competition sponsored by the Australian Meat Board in the first instance in 1948 was again conducted in 1949.

The conditions were altered in some detail for the 1949 season, where as in 1948 an entry consisted of three pigs, each entry in 1949 was one pig only and a competitor was allowed a maximum of two entries.

As in the previous years the State was divided into six zones and the following entries were received from each:—

No. 1 Zone,	11 entries,	3 overweight.
No. 2 Zone,	33 entries,	3 overweight.
No. 3 Zone,	9 entries,	1 overweight.
No. 4 Zone,	6 entries,	2 overweight.
No. 5 Zone,	No entries.	
No. 6 Zone,	2 entries.	
Total ..	61 entries,	9 overweight.

The interest shown in the dairy belt Zones 1, 2 and 3 is quite good, but the response from other Zones remains disappointing.

All entries were judged at the Watson's Supply Stores Bacon Factory, Spearwood, on September 29, 1949, under the Smithfield System as devised by Messrs. H. R. Davidson, John Hammond, Jos. B. Swain and Nevill L. Wright.

Judging was carried out by Messrs. H. A. Watson, G. E. Fewster and M. Cullity assisted by the writer and officers of the Dairy Branch. A demonstration of the carcases was held at the Bacon Factory on the 6th October, when prizes won were presented by Mr. R. B. Williamson.

Table 1 gives details of the entries and the points scored by each carcase in each section of judging under the system.

TABLE I.

BACONER CARCASE COMPETITION, 1949.

Owner.	Breed.	Principal Feeds etc.	Weight.	By Inspection.			By Measurement.				Total.
				Ham.	Shoulder.	Streak.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	
		ZONE 1.	Max.	(8)	(7)	(12)	(28)	(20)	(20)	(5)	(100)
A. J. White & Sons, Mandogalup	Tamworth-Berkshire	Gristed wheat and barley, skim milk, green feed	156	6	6	10	21	20	10	3	76
Do. do.	do. do.	do. do.	174	7	4	11	22	14	4	5	67
R. R. Piercy, Melville	Large White-Large White cross	Crushed cereals, buttermilk, meatmeal	163	5	5	7	15	19	10	3	64
Do. do.	do. do.	do. do.	178	6	5	8	9	18	5	5	56
Lilly & Costello, Mt. Helena	Tamworth-Berkshire	Wheat and meatmeal, a little green feed and milk	156	6	6	7	18	1	6	5	49
C. D. Pailthorpe, Pinjarra	Tamworth - Grade Berkshire	Skim milk, pollard, crushed wheat	139	7	4	7	17	1	6	5	47
Do. do.	Tamworth - (Tamworth × Berkshire)	do. do.	145	7	5	7	5	4	4	5	37
Fergusons Pty., Ltd., Riverton	Tamworth-Berkshire	Swill and wheat, meat meal	168	5	6	4	15	....	....	5	35
Do. do.	do. do.	do. do.	182*	....	....	....	....	....	....	....	....
Parker & Russell, Mt. Helena	Large White-Berkshire	Gristed wheat and meat meal, grazing	197*	....	....	....	....	....	....	....	....
Do. do.	do. do.	do. do.	200*	....	....	....	....	....	....	....	....
		ZONE 2.									
A. E. Dunkley, Capel	Tamworth-Berkshire	Butter milk and crushed wheat	157	7	6	10	19	18	12	4	76
A. E. Poad, Dardanup	Tamworth - Large Black	Skim milk, pollard, boiled potatoes, grazing	131	6	5	8	20	18	16	2	75
G. A. and V. M. Heathcote, Northcliffe	Berkshire....	Skim milk, pollard, grazing	139	4	5	8	28	15	12	2	74
J. Jarvis, Donnybrook	Large White-Berkshire	Skim milk, crushed wheat, green feed	142	6	6	8	24	15	15	....	74
Scott and Scrivener, Capel	Tamworth - Large Black	Butter milk, crushed wheat, green feed	176	6	5	11	18	20	11	3	74
B. W. Starkie, Manjimup	Berkshire - Large White	Skim milk, crushed wheat, grazing	152	5	5	7	21	17	13	5	73
R. P. and J. J. Littlefair, Pemberton	Large White × Tamworth × Berkshire)	do. do.	152	5	5	9	18	18	13	4	72
H. W. Shotter, Walpole	Tamworth-Berkshire	Crushed wheat, pollard, grazing	159	5	6	9	25	19	8	....	72
H. Dunkley, Capel	do. do.	Butter milk, crushed wheat	156	6	4	11	17	20	8	5	71
J. Jarvis, Donnybrook	Large White-Berkshire	Skim milk, crushed wheat, green feed	142	6	5	9	16	16	14	2	68
A. E. Dunkley, Capel	Large White	Butter milk, crushed wheat	159	6	0	10	18	15	10	3	67
S. C. Maidment, Balingup	Berkshire	Skim milk, crushed wheat, grazing	159	5	5	9	16	18	7	5	65
A. E. Poad, Dardanup	Tamworth - Large Black	Skim milk, pollard, boiled potatoes, grazing	133	5	5	8	17	20	10	....	65
H. W. Shotter, Walpole	Tamworth-Berkshire	Pollard, wheat, skim milk, grazing	156	6	5	6	17	20	6	4	64
Scott and Scrivener, Capel	Tamworth	Butter milk, crushed wheat, green feed	179	7	4	9	18	17	3	3	61
Austin Bros., Jardee	Berkshire....	Skim milk, crushed wheat	167	6	2	8	15	18	6	5	60
R. G. Brazier, Kirup	Large White-(Berkshire-Tamworth)	Skim milk, pollard, crushed wheat	171	6	5	10	9	20	6	4	60
G. A. and V. M. Heathcote, Northcliffe	Berkshire....	Skim milk, pollard, grazing	149	3	5	8	20	14	10	....	60
H. S. and F. D. Moyes, Bridgetown	Large White-Tamworth	Skim milk, crushed wheat, grazing	132	5	6	8	13	16	8	4	60
R. G. Brazier, Kirup	Large White-(Berkshire-Tamworth)	Skim milk, pollard, grazing	165	6	6	8	9	18	9	3	59
R. P. and J. J. Littlefair (Pemberton)	Large White-(Tamworth & Berkshire)	Skim milk, crushed wheat, grazing	139	4	6	8	11	16	11	2	58

* Overweight.

TABLE I.—*continued.*

BACONER CARCASE COMPETITION, 1949.

Owner.	Breed.	Principal Feeds, etc.	Weight.	By Inspection.			By Measurement.				Total.
				Ham.	Shoulder.	Streak.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	
			Max.	(8)	(7)	(12)	(28)	(20)	(20)	(5)	100
H. Dunkley, Capel	Tamworth-Berkshire	Butter milk and crushed wheat	171	6	4	9	18	10	5	5	57
J. W. Hutchins, Northcliffe	Large White-(Large White × Tamworth)	Pollard, crushed wheat skim milk	177	4	4	11	16	18	3	1	57
W. Muir, Manjimup	Large White-Berkshire	Crushed wheat, skim milk	169	5	4	9	13	19	7	....	57
E. W. M. Trigwell, Donnybrook	Tamworth	Skim milk, crushed wheat, grazing	147	4	6	10	5	20	11	....	56
H. S. and E. D. Moyes, Bridgetown	Large White (Tamworth × Berkshire)	do. do.	140	5	6	5	9	19	4	2	50
S. C. Maidment, Balingup	Berkshire....	do. do.	167	6	3	4	13	7	6	5	44
Thomson Bros., Pemberton	Large White	Crushed wheat, skim milk, meat offal	141	6	6	7	....	10	8	4	41
C. G. Mix, Boyup Brook	Tamworth	Pollard, skim milk, crushed wheat, grazing	168	5	4	5	11	1	3	....	29
Thomson Bros., Pemberton	Large White	Crushed wheat, skim milk, meat offal	167	3	6	7	....	....	7	2	25
J. W. Hutchins, Northcliffe	Large White-(Large White × Tamworth)	Pollard, crushed wheat, skim milk	183*	....	....	....	....	....	....	....	....
R. E. Upsom, Capel	Berkshire-Tamworth	Butter milk to capacity, crushed wheat	196*	....	....	....	....	....	....	....	....
Do. do.	do. do.	do. do.	200*	....	....	....	....	....	....	....	....
		ZONE 3.									
R. F. Blight, Denmark	Berkshire....	Skim milk, crushed wheat, grazing	133	5	5	8	14	16	19	5	72
A. K. Stirling, Kendenup	do.	do. do.	158	6	5	9	19	16	13	4	72
Do. do.	do.	do. do.	167	5	5	10	17	18	12	5	72
R. F. Blight, Denmark	do.	do. do.	142	7	3	7	18	16	15	5	71
A. J. King & Son, Denmark	Tamworth-Berkshire	Skim milk, crushed wheat, pollard, green feed	164	5	5	8	15	17	18	2	70
S. Hutchings, Torbay	Berkshire - (Berkshire × Tamworth)	Pollard, bran, skim milk, swill	141	7	7	8	19	12	12	4	69
H. N. Bidewell, Denmark	Tamworth-Berkshire	Skim milk, crushed wheat, grazing	140	4	4	6	15	17	9	2	57
Do. do.	do. do.	do. do.	142	4	5	6	13	19	6	....	53
A. J. King & Sons, Denmark	do. do.	Skim milk, crushed wheat, pollard, green feed	185*	....	....	....	....	....	....	....	....
		ZONE 4.									
R. and J. Overheu, Brookton	Berkshire....	Crushed wheat, barley, and oats, grazing	162	6	4	8	18	20	11	4	71
N. A. Stone, Northam	do.	Meat, crushed wheat, green feed	177	5	4	8	16	14	2	5	54
J. and J. Overheu, Brookton	do.	Crushed wheat, barley and oats, grazing	172	6	5	5	19	1	7	5	48
W. G. Burges, Burges Siding	do.	Wheat, grazing	179	2	7	4	3	16	11	....	43
Do. do.	do.	Wheat and meat meal, grazing	182*	....	....	....	....	....	....	....	....
N. A. Stone, Northam	do.	Meat, crushed wheat, green feed	182*	....	....	....	....	....	....	....	....
		ZONE 5.									
		No entries.									
		ZONE 6.									
Tolerton Dunlop, Kellerberrin	Large White-(Large White-Berkshire)	Wheat, bran and pollard, hay, grazing	125	6	6	9	15	17	16	4	73
Do. do.	do. do.	do. do.	131	4	7	5	13	15	20	....	64

* Overweight.

The State Championship award was divided between the entry of A. J. White and Sons, Mandogalup, in Zone 1 and A. E. Dunkley, Capel, in Zone 2, each entry scoring 76 points.

A study of the Table shows that no carcases were successful in obtaining full marks for ham or streak which are judged by inspection, but one carcase gained full points for shoulder. One carcase gained the full 28 points for eye muscle; seven were awarded full points for back fat, one carcase gained the maximum points for body length and 17 full marks for length of leg.

Table 2 gives a comparision of the average points scored in each section in the 1948 and 1949 competition.

TABLE 2.

COMPARISON OF AVERAGE POINTS SCORED IN EACH SECTION IN THE 1948 AND 1949 COMPETITIONS.

Competition.	No. of Entries Eligible.	Ham.	Shoulder.	Streak.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	Average.
		Max. pts. 8	Max. pts. 7	Max. pts. 12	Max. pts. 28	Max. pts. 20	Max. pts. 20	Max. pts. 5	Max. pts. 100
1948	37	6·35	5·50	9·29	16·73	14·57	9·14	3·43	65·11
1949	52	5·38	5·04	7·90	15·19	14·67	9·21	3·08	60·52

It will be seen that scoring in all sections was higher in the 1948 series with the exception of back fat and body length. The comparision is hardly a fair one as in the first competition, competitors were allowed three pigs to an entry and the best two of these were taken for the final points allotment.

The average score of 60.52 points over the whole 52 carcases eligible is really a very good result when it is realised that in actual practice a carcase scoring 60 points under the system is considered to be of very high quality.

Table 3 analyses the results of the entries on the basis of the breed of the boar siring the entry.

The Tamworth sired the largest number, 20 out of the 52, followed by Large White with 17 and Berkshire with 15. However the highest average number of points awarded, went to the Berkshire sire with 63.7 followed by Tamworth with 59.5 and Large White with 59.1.

BACON CARCASE COMPETITION, 1949.

TABLE 3.

Percentage of Maximum Points according to Breed of Boar.

Breed of Boar.	No. of Entries.	Weight. lb.	Ham.	Shoulder.	Streak.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	Percent. Averag
Maximum pnts.	....	....	8	7	12	28	20	20	5	100
Berkshire	15	157·6	65·0	66·7	61·7	61·0	72·7	52·0	78·7	63·2
Tamworth	20	155·8	71·2	70·7	67·5	58·2	69·0	39·0	58·0	59·5
Large White	17	152·5	64·7	78·1	67·2	43·7	79·1	48·8	50·6	59·1

Carcases Overweight—4 Berkshire ; 2 Tamworth ; 3 Large White.

In Table 4 further examination of the results has been made according to breed of the entry itself rather than breed of the sire as given in Table 3.

TABLE 4.

PERFORMANCE OF BREEDS AND CROSSBREEDS.

Percentage of Maximum Points.

Breed	No. of Entries.	Weight. lb.	Ham.	Shoulder.	Streak.	Eye Muscle.	Back Fat.	Body Length.	Leg Length.	Total.
Maximum pnts.	....	....	8	7	12	28	20	20	5	100
Berkshire pure bred	13	159·3	63·5	63·7	61·5	65·9	72·7	50·4	76·9	62·0
Berkshire-Tamworth	12	158·2	69·8	72·6	67·4	64·0	72·9	42·5	66·7	62·2
Berkshire-(Berkshire-Tamworth)	1	141·0	87·5	100·0	66·7	67·8	60·0	60·0	80·0	69·0
Tamworth-Grade Berkshire	1	139·0	87·5	57·1	58·3	60·7	60·7	30·0	100·0	47·0
Tamworth-(Berkshire-Tamworth)	1	145·0	87·5	71·4	58·3	17·8	14·3	20·0	100·0	37·0
Tamworth-Large Black	3	146·7	70·8	71·4	75·0	62·5	96·7	61·7	33·3	71·3
Tamworth pure bred	3	164·7	66·7	66·7	66·7	30·5	63·3	28·3	20·0	48·7
Large White-Large White Cross	2	170·5	68·7	71·4	62·5	42·9	92·5	37·5	80·0	60·0
Large White-Berkshire	4	151·2	68·7	71·4	68·7	66·1	83·7	61·1	35·0	68·0
Large White-(Tamworth-Berkshire)	5	153·4	65·0	80·0	66·7	40·0	91·0	43·0	60·0	59·8
Large White-Tamworth....	1	132·0	62·5	85·7	66·6	46·4	80·0	40·0	80·0	60·0
Large White-(Large White-Tamworth)	1	171·0	50·0	57·1	91·7	57·2	90·0	15·0	20·0	57·0
Large White....	3	155·7	62·5	81·0	66·7	21·4	41·7	41·7	60·0	44·3
Large White (Large White-Black)	2	128·0	62·5	92·7	58·3	50·0	80·0	90·0	40·0	68·5

Carcases Overweight: 2 Berkshire ; 4 Berkshire-Tamworth ; 2 Large White-Berkshire ; 1 Large White-(Large White-Tamworth).

A perusal of the Table shows that the highest averages are those of the Tamworth x Large Black; Berkshire x (Berkshire x Tamworth) sows; Large White x (Large White x Large Black) sows and Large White x Berkshire sows.

Data on sufficient entries is not available to make the results of this table significant.

On the entry form competitors are asked to supply details of the feeds used in the feeding of each entry and such information is given in Table 1.

It is known that the quantity and quality of food used has a definite influence on the quality of the carcase irrespective of breed.

It will be seen from the Table that the kinds of feeds used varies little between competitors, so that the differences in carcases shown by the results are likely to be due to the proportions in which each type of food is used.

No constructive comment can be offered in regard to individual feeding practices, without a great more detail than given on the entry forms; but it is suggested that owners can gain much knowledge of the type of carcase required by studying the results of such competitions as this, and more particularly by viewing the carcases on the hook, and subsequently such knowledge can be applied in their feeding practices to very good effect.

NEW CEREAL VARIETIES IN AUSTRALIA—1948-49.

I. THOMAS, Registrar of Cereal Varieties in Australia and
E. R. WATSON, Plant Geneticist.

IN the earlier history of plant breeding in Australia and in other countries, improvements were often effected by the selection of promising plants from bulk crops. These plants usually showed by their general improvement over the remainder of the crop that they were more suited to the soil and climatic conditions of the area. The next important step in plant improvement was the introduction of crossbreeding methods. These methods permitted the breeder, by means of cross pollinations and subsequent selection work, to incorporate in one variety the more favourable characteristics of the two parents.

Although William Farrer was a pioneer in the field of wheat breeding, his methods of approach to the numerous problems which confronted him have influenced plant breeders throughout the world since that time. When he commenced his wheat breeding activities he had as his aim the production of a variety which was resistant to stem rust, a disease which at that time was menacing the wheat industry in Australia.

Farrer did not, however, entirely realise his aim in this connection, as none of his varieties was really rust resistant in the present-day acceptance of the term. Indirectly however, some of his ambitions were achieved, because his early maturing wheats enabled wheat growing to be carried on in areas previously too dry for the very late maturing varieties which had been brought to the colony from England and other parts of the world. In these areas stem rust did not present such a danger as the seasonal conditions were not so favourable to epidemic conditions. Also some of the varieties Farrer produced were capable of escaping the disease by virtue of their early maturity.

Within recent years a number of varieties have been registered which have actually possessed resistance to wheat stem rust. Most of these varieties have been capable of yielding well under a wide variety of conditions and have been satisfactory from the point of view of flour quality. By using a rust resistant variety as one parent, plant breeders in the various States have produced these varieties by means of cross pollination, with selection for the various desirable characteristics in the resulting generations.

Although very satisfactory varieties have been produced by these methods there are nevertheless a number of important difficulties to consider. The main one is that the parent varieties which possess rust resistance quite often are most unsuitable from the point of view of maturity, yielding ability etc. This factor increases the difficulty of combining the disease resistance with the other desirable characteristics in a crossbred variety. Thomas and Millington (1945) have reviewed the registration of cereal varieties up to that year and a number of individual varieties have been described in subsequent issues of the Journal of this Department (December, 1947, March, 1949).

At the Waite Agricultural Research Institute in South Australia, Pugsley realised the value of existing popular varieties which as he stated (1949) "possessed qualities that had been synthesised through the painstaking efforts of breeders in past years." He decided to utilise backcross programmes to add stem rust resistance to the valuable characteristics already possessed by a number of popular varieties.

The technique of backcrossing was described by Harlan and Pope (1922) while Miles first suggested its value to Australian plant breeders in 1935. The method suggests the possibility of using existing varieties, known to possess excellent yielding ability, as a basis and by a process of backcrossing improving the existing faults of these varieties so that they will be capable of high yields of good quality grain under varying soil, climatic and epidemic conditions.

Selecting nine wheat varieties which were either extensively grown or gave promise of being important, two parallel backcrossing programmes were commenced at the Waite Institute in 1942. With the breakdown of the Kenya C6040 type of resistance, the programme using Eureka as the non-recurring parent was abandoned while the Gabo lines were continued. Resistant segregates from the original cross were backcrossed to the recurring parent and this was repeated four times. The backcross derivatives were then selected and compared with the recurring parent for several years before they were submitted for registration for distribution to farmers. Each derivative variety closely resembled the recurrent parent except that it possessed resistance to wheat stem rust (Puccinia graminis Tritici).

Seven of these varieties have been accepted for registration under the names, Bencubbin 48, Dundee 48, Javelin 48, Rapier 48, Ridley 48, Scimitar 48, and Seewari 48. The varieties are named in accordance with the amended rules for nomenclature of cereal varieties in Australia. The first part of the name refers to the recurrent parent while the numeral refers to the years of registration.

It is extremely unfortunate that before the value of these backcross varieties could be appreciated, a new complex of stem rust races was isolated in New South Wales, capable of attacking them and to a lesser degree the non-recurring parent Gabo. Having regard to the lapse between the appearance of the Eureka attacking rust race 126B (previously designated as a biotype of race 34) in the Eastern States and in this State it is to be hoped that Gabo and its derivatives will experience a similar period of immunity in Western Australia.

A further disadvantage of these backcross varieties is that some of them appear to be more susceptible to flag smut than their recurrent parent. This is possibly due to the fact that the Gabo parent is fairly susceptible to this disease.

A short description of each variety is as follows:—

Bencubbin 48.

This variety is very similar to the parent variety Bencubbin. It is of similar maturity, and yield trials so far conducted indicate that it has equivalent yielding capacity. It appears to have a slightly more vigorous early growth than Bencubbin and the grain is semi-translucent as compared with the starchy grain of Bencubbin. This apparently has had no effect on the flour strength which is approximately equal in the two varieties. In flag smut tests conducted at the Waite Institute and in this State it was shown to be appreciably more susceptible to this disease than Bencubbin, although it can still be regarded as a fairly resistant variety.

Dundee 48.

Brown tapering, partly bearded head with white semi-translucent grain. The young growth is erect and strong and it has a good tillering habit. It is of mid-season maturity being equal to Dundee in this respect and has medium tall, strong

straw. It appears to be very similar to Dundee with respect to yielding ability and flour quality, but gives a more susceptible reaction to flag smut than that variety.

Javelin 48.

White tapering, partly bearded head with white semi-translucent to starchy grain. The young growth is erect and strong and the tillering habit is good. The straw is usually of medium height and strong and the grain threshes easily with little or no shedding. Of midseason maturity it is one to two days later maturing than Javelin, but appears to be similar in respect to yielding ability and flour strength. It has significantly outyielded Javelin in a number of trials but in other trials has yielded the same as that variety. It also gives a higher flag smut infection and results of a number of tests show that it is bordering on being a fairly susceptible variety.

Rapier 48.

This variety possesses a white, smooth, tapering, partly bearded head with white rounded, starchy grain which is similar in quality to that of Rapier. The young growth is erect and strong and the tillering habit is good. The straw is of good strength and medium tall. It threshes readily with a moderate tendency to shedding. Like Rapier it is of early mid-season maturity and it is equal to that variety in yielding capacity.

Ridley 48.

Of similar mid-season maturing to its recurring parent, this variety is also similar to Ridley in respect to flour quality and yielding ability. The square head is white and partly bearded and the grain is white, angular and semi-translucent. Unlike other backcross derivatives Ridley 48 is less susceptible to flag smut than its parent.

Scimitar 48.

This early mid-season maturing variety is equal to Scimitar in respect to yielding ability. It is also of equal high flour quality a characteristic for which Scimitar is noted. It has a white, tapering, partly bearded ear and the grain is white, round and translucent. The young growth is erect and strong with a medium tillering habit. The straw is mid tall and medium strong. It is more susceptible to flag smut than Scimitar.

Seewari 48.

A brown, clubbed, partly bearded head with white, round, starchy grain. Seewari 48 is of late mid-season maturity and is equal to the parent variety in yielding ability and flour quality. Like Ridley 48 it appears to be less susceptible to flag smut than Seewari.

Each of the above varieties is resistant to races 126 and 126B of stem rust (Puccinea graminis Tritici) but susceptible to a new complex of races isolated in New South Wales in 1948.

OTHER VARIETIES.

Prior to the registration of the above varieties the Waite Agricultural Research Institute submitted a further variety for registration under the name of White Federation 45. As it was to be used only by plant breeders as rust resistant parent material it was not accorded full registration but was provisionally registered for this purpose.

In addition to the varieties submitted by the Waite Institute, two other wheat varieties were also registered during 1948-49. The varieties were named Curlew and Brolga and were submitted for registration by the New South Wales Department of Agriculture. Details of these two varieties are as follows:—

Curlew.

This variety originated from the cross (Bobin x Dundee) x Gular which was made at the Temora Experiment Farm, New South Wales, by T. E. Kitmura. It has a white, tapering, erect, partly bearded head with smooth glumes. The grain is white, angular and starchy to semi translucent. The young growth is erect and strong and the tillering habit is good. It has fine white straw of medium height which stands well. The grain is adherent in the head but it threshes readily. The variety is of mid-season maturity being similar to Bencubbin in this respect. Although it is resistant to flag smut, Curlew is susceptible to stem and leaf rusts. The baking quality is comparatively high. The gluten possesses good elasticity and stability comparing favourably with that of Dundee. It is much superior to Bencubbin in this respect and in a number of trials conducted in New South Wales from 1943-48 it has shown to have an excellent yielding capacity.

Brolga.

The cross Bobin x Dundee was made at the Temora Experiment Farm, New South Wales, by T. E. Kitamura in 1937. The variety is of mid-season maturity maturing a few days later than Bencubbin. It has medium to coarse straw, standing very erect and in this respect resembles the parent Dundee. Foliage is the deep olive green of Bobin from which the variety has inherited a marked drought resistance. The grain does not shatter but threshes easily. The baking quality is good possessing better gluten quality than Dundee. It has a brown, square, erect partly bearded head and the white angular grain is semi-translucent.

Brolga is resistant to flag smut but is susceptible to stem and leaf rusts. It has yielded consistently well under a wide variety of conditions in New South Wales and the Department of Agriculture in that State believes that if widely sown it should greatly enhance the quality of wheat grown in the Western and Southern Districts of New South Wales.

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FOOTROT (FOUL FOOT) OF DAIRY CATTLE.

C. R. TOOP, Acting Chief Inspector of Stock.

Although it cannot be regarded as a disease of a serious economic importance, footrot in cattle may at times become a source of serious loss to individual dairy farmers. The occurrence of the disease is usually confined to a small number of isolated cases which may make their appearance in the herd during the course of the season, but sometimes it assumes what has been described as a contagious form in which a large number of animals may become affected in rapid succession.

The disease is caused by infection with the necrosis bacillus (*Fusiformis necrophorus*) which is widely distributed in nature and is frequently present in the soil in the vicinity of cow yards. It gains entrance to the tissues of the foot through small wounds and abrasions and is apparently also able to invade tissues which have become softened by constant exposure to mud and water.

The majority of outbreaks of footrot consequently occur during winter when conditions underfoot are wet and muddy but the disease is by no means confined to this period.

During recent years many quite serious outbreaks have been encountered during the summer months and it is presumed that the feet have become wounded or abraded by contact with sharp objects or rough surfaces and that infection has subsequently occurred by contact with contaminated mud in the vicinity of dams or water troughs or from organisms which have persisted in the dry soil.

SYMPTOMS.

Affected animals show symptoms of lameness, at first slight, but later becoming severe and this is accompanied by rapid loss of condition and a marked drop in milk production. The lameness is usually confined to one limb but both fore and hind feet appear to become affected with equal frequency. The affected foot is inflamed and swollen to the level of the fetlock. A close examination will in most cases reveal necrosis or sloughing of the skin between the claws and the presence of a purulent discharge. In some cases an abscess may form above the coronet and unless opened and drained may eventually rupture.

In old-standing cases in which the joints and tendons have become involved there is chronic lameness and permanent enlargement of the extremity.

TREATMENT.

Prior to the advent of the sulpha drugs the treatment of footrot presented a difficult problem. Recovery was usually slow and in the meantime a marked loss of condition and milk production occurred. The treatment recommended consisted of the immersion of the affected foot for several hours daily in a

warm antiseptic solution but this method was seldom applicable under practical dairying conditions. A more practical approach consisted of the application of a mixture composed of Stockholm tar 1 pint, finely powdered bluestone 1 ounce, lysol 1 ounce, to the affected parts with a stiff brush after thorough cleansing of the foot and the removal of necrotic tissue. It was necessary to repeat this treatment twice daily and to keep the animal on clean dry ground until recovery occurred.

It has recently been shown that a satisfactory response in the treatment of footrot in cattle may be obtained from the administration of certain of the Sulphonamides which renders local treatment unnecessary.

SULPHAMEZATHINE.

Sodium sulphamezathine 33⅓ per cent. solution is the drug of choice. This preparation is now freely available in bottles of 100 c.c. and 500 c.c. from chemists and livestock agents. The dosage for adult cattle is 100 c.c. administered by subcutaneous injection. This injection should be made beneath the skin of the neck or behind the shoulder using a syringe or injection apparatus of suitable capacity. A four ounce metal syringe fitted with a short length of rubber tubing and a 12 gauge needle or a milk fever injection outfit may be found convenient for the purpose.

Sulphamezathine is non-irritant to the tissues so that the development of a swelling or abscess formation at the site of injection need not be feared. Following treatment, a marked improvement in the condition of the animal will be observed within 48 hours and by the end of the third day, recovery in the majority of cases will be complete. Should the response not be satisfactory treatment should be repeated after an interval of three days. The cost of each injection is about ten shillings but when treatment is undertaken early no loss of condition or of production need occur and the saving thus effected will more than offset the expense involved.

Equally good results may be obtained from the injection of sodium sulphapyridine in a dosage of 60 grams (2 ozs.) dissolved in 500 cc. of water. This preparation must however be given by intravenous injection and it is consequently not suitable for use by the dairy farmer.

Satisfactory results have also been reported from the use of sulphanilamide given by the mouth in a dosage of eight ounces and repeated at intervals of three days when necessary. This drug does not however appear to be so reliable as sulphamezathine and its administration is not so convenient.

PREVENTIVE MEASURES.

It is difficult to recommend any effective method of prevention. Sharp objects which are likely to injure the feet should be sought for and removed. Approaches to gateways and lanes should be built up and yards should be paved so as to avoid exposure to foul, muddy conditions. The application of a heavy dressing of slaked lime in the vicinity of entrance or exit gates has been advocated but this appears to be of doubtful value. A concrete foot bath containing a 10 per cent. solution of bluestone (1lb. bluestone to the gallon of water) at the entrance to the milking shed may in some cases be found helpful.

PULLORUM TESTED FLOCKS.

The following is a list of flocks which have been regularly tested under the Voluntary Pullorum Disease Control Scheme conducted by this Department and which have complied with the requirements set out therein.

The breeds included in these tests are indicated as follows:—

Breeds—
A.O. Australorps.
W.L. White Leghorns.
B.L. Brown Leghorns.
L.B. Leg Bar.
R.I.R. Rhode Island Red.
X-Bred Cross Bred.

Name.	Address.	No. of Birds.	Breed.	Percentage Reactors at Last Test.
Carter, S. F. and A. V.	Osborne Park	1,956	A.O., W.L., X-Bred	5·5
Cook, G.	Belmont	743	A.O., W.L., R.I.R.	1·08
Collingwood, W. P. and C. A.	Collie Burn	2,300	A.O.	0·09
Dawson, D.	Belmont	497	A.O., W.L.	2·0
Duncan, J.	Belmont	1,645	A.O., W.L., B.L., L.B.	3·8
Fisher, D.	Maddington	979	A.O., W.L.	0·8
Gale, L. T.	Midland Junction	140	A.O., W.L.	0·0
Hall, W. G.	Jandakot	1,128	A.O., W.L.,	1·0
Hampton, A.	Belmont	1,145	A.O., W.L., R.I.R.	2·8
Hollow	Swan View	631	A.O., W.L., R.I.R., X-Bred	1·7
Hosken, J.	Hilton Park	452	A.O.	0·9
Leonard, E. M.	Mt. Helena	1,524	A.O., W.L., R.I.R.	0·6
Martin, V.	Gosnells	1,318	A.O., W.L., R.I.R.	2·0
Parrin	Wanneroo	117	A.O.	0·9
Purves, N.	Armadale	973	A.O., W.L., R.I.R.	3·1
Sansom, G.	Gosnells	927	A.O., W.L., X-Bred	5·2
Smith, J. E.	Tuart Hill	2,162	A.O., W.L., R.I.R.	0·6
Woodard	Queens Park	2,141	A.O., W.L.	2·3
Whitfield	Kellerberrin	1,261	A.O., W.L.	0·0

BETTER DAIRYING COMPETITION 1949-50.

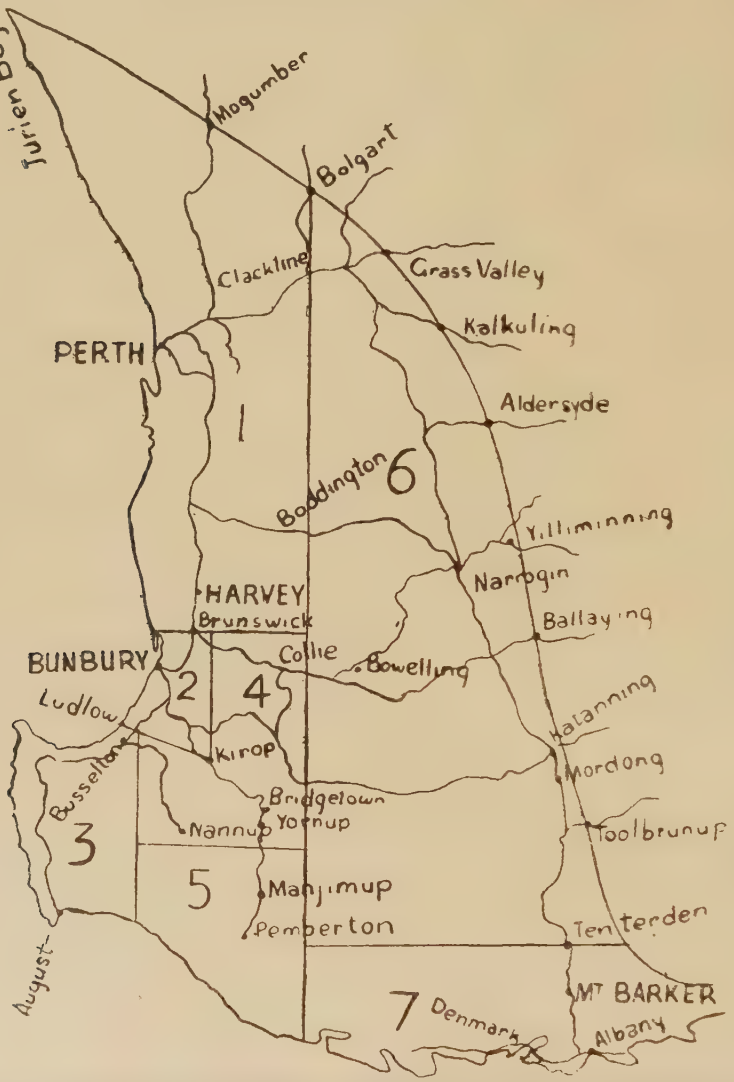
R. A. PAUL, B.Sc. (Agric.), Assistant Superintendent of Dairying.

THIS competition was sponsored again during the year 1949-50 by the W.A. Pasture Improvement Committee of the Australian Dairy Produce Board, who also receive funds from the Rural Credits Branch of the Commonwealth Bank. The Committee offered substantial cash prizes in the seven zones as detailed below.

The Department fully supported the project and concerned itself in interesting the farmers to enter the competition, as well as carrying out the judging in all zones.

The following scale of points was used in judging zones 1–5 and 7—

	Points.
Conservation of Fodder and Summer Crops	300
Pastures	240
Dairy Herd	120
Return of Butterfat etc. per acre	120
Pigs	30
Farm Management	140
Utilisation of Skim Milk	50
Total	1,000



MAP SHOWING THE ZONES COVERED BY THE COMPETITION.

As shown on the above map the South-West Division was divided into seven zones for the purposes of the Competition.

Zone 1 Coastal.
Zone 2 Bunbury-Donnybrook.
Zone 3 Busselton-Margaret River.
Zone 4 Bridgetown.
Zone 5 Manjimup-Northcliffe.
Zone 6 Great Southern.
Zone 7 South Coastal.

Cash prizes were offered in each zone—
First £20 and framed certificate; second £12; third £8; fourth £6.

The above scale was adjusted for those competitors who sold their produce as whole milk in order to place them on an even footing with the producer of cream for the manufacture of butter. The method of awarding points in the

Dairy Herd Section was altered from that operating in the 1948-49 competition. Whereas previously the majority of the points in this section were allotted for breed type judged by eye appraisal, in the competition under discussion such points were allotted on the basis of average production per cow. The result of this change was that scoring generally in this section is lower than was the case in the previous year.

In zone 6 the competition was conducted only in relation to fodder conservation and the following scale of points was used:—

	Points.
Fodder Conserved per Dairy Cow	100
Hay—Quality and Condition	50
Use of Phosphatic Supplements	25
Silage or Summer Fodder Crops	50
Sanitation of Dairy Premises	25
Total	250

In order to facilitate judging and ensure as much uniformity as possible between judges, the scales shown were expanded within each section and these details are shown in Tables I to VII.

The number of entries in each zone with the exception of zones 5 and 6 was very pleasing and are shown below—

Zone 1	19
Zone 2	12
Zone 3	10
Zone 4	15
Zone 5	8
Zone 6	3
Zone 7	16

Judging in each zone was conducted between November 1st, 1949 and February 28th, 1950, it being necessary in zones other than zone 6 to visit each farm at least twice in this period, in order to acquire a proper appreciation of the progress being accomplished in each section.

Details of the points allotted to each competitor are given in the following Tables I to VII.

Successful competitors in the 1949-50 competition were handicapped on the basis of—

First Prize Winner	deduct 15 points.
Second Prize Winner	deduct 10 points.
Third Prize Winner	deduct 5 points.
Fourth Prize Winner	deduct 1 point.

Such deductions are shown at the bottom of each Table.

TABLE I.

POINTS GAINED BY COMPETITORS IN ZONE 1—COASTAL. Judge: R. A. Paul.

	Maximum Points.	E. M. Webb.	A. Cunningham.	E. Rosher.	W. Pethwick.	Leaver & Sons.	J. E. Murray.	L. M. Temple.	J. England.	C. Pailthorpe.	S. Mullins.	W. A. Ward.	R. O. Briggs.	T. Abbott.	Kentish Bros.	L. Jackman.	J. Pailthorpe.	W. Dunne.	D. K. Watts.	E. C. Craighill.
1. *Conservation of Fodder and Summer Fodder Crop* (300 Points)—																				
(a) Hay, quality, condition	40	36	35	36	37	36	35	25	36	36	32	35	36	34	36	35	28	....	32	25
(b) Baling	10	....	....	10	10	10	....	10	5	10	....	....	....	10	10	10	....	....	10	8
(c) Silage, quality, type, wastage	25	22	22	....	23	23	....	....	....	....	22	....	....	....	....	....	....	....	....	....
(d) Summer fodder crops; cultivation, disease, yield	25	22	22	22	....	20	24	....	22	....	20	22	....	....	....	....	....	....	....	....
(e) Amount conserved per cow	200	200	200	118	173	157	184	90	94	97	117	100	69	85	121	120	62	....	19	50
2.—*Pasture* (240 Points)—																				
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	112	110	90	99	100	91	120	113	95	92	90	105	113	74	81	71	108	86	62
(b) Management, fertilisation	100	75	65	85	70	60	60	80	77	65	55	60	65	75	50	55	55	65	60	40
3.—*Dairy Herd* (120 Points)—																				
(a) Dairy type	50	17	42	23	27	16	19	15	15	17	19	16	15	20	19	19	17	16	13	16
(b) Condition	20	18	20	20	19	18	18	19	19	19	18	19	19	19	18	18	18	20	17	16
(c) Freedom from disease	20	17	18	18	18	17	17	19	18	19	16	18	18	19	16	16	18	20	15	15
(d) Herd sire (1) Pure Bred	20	....	20	20	18	20	19	20	....	20	20	20	20	20	20	20	20	....	....	20
(2) *Ex* tested dam	10	....	5	9	....	....	6	10	....	10	10	7	7	9	6	....	7	..	..	....
4.—*Returns per Acre* (120 Points)—																				
(a) Butter fat.....lb. per acre	100	75	43	100	48	29	34	34	41	24	36	24	29	35	26	22	70	54	15	18
(b) Sidelines (pigs, poultry, vegetables, etc.) £.....per acre	20	3	3	4	2	2	1	3	2	7	1	....	8	1	1	3	1	15	11	1

	Maximum Points.	E. M. Webb.	A. Cunningham.	E. Rosher.	W. Pethwick.	Leaver & Sons.	J. E. Murray.	L. M. Temple.	J. England.	C. Pailthorpe.	S. Mullins.	W. A. Ward.	R. O. Briggs.	T. Abbott.	Kentish Bros.	L. Jackman.	J. Pailthorpe.	W. Dunne.	D. K. Watts.	E. C. Craighill.
5.—*Pigs* (30 Points)—																				
(a) Breed, type and condition	10	.	. .	....	....	....	. .	...	....	9	....	....	9	....	....	.	. .	9	7	....
(b) No. of breeding sows in proportion to milch cows . .	10	.	..	.	.		...			10			10			.		10	8	..
(c Housing, feeding and management	10	...	. .	...	. . .	.		. .		9	.		8		.			8	6	. .
6.—*Farm Management* (140 Points)—																				
(a) Lay-out, convenience, etc.	50	42	38	38	38	36	38	45	42	35	30	40	40	42	30	33	38	42	30	38
(b) Sanitation :																				
(i) General	30	28	28	28	25	27	25	28	26	26	20	26	28	24	28	22	28	24	22	21
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	32	38	40	36	36	32	38	35	32	28	36	34	30	36	25	32	35	28	32
(c) Book-keeping and records	20	20	10	19	18	17	18	20	18	18	15	18	18	12	18	12	16	14	15	18
7.—*Utilisation of Skim Milk* (50 Points)—																				
Based on number of pigs and calves fed	50	....	....	....	....	....	....	....	....	50	....	....	28	10	....	32	....	50	28	....
Total	1,000	719	719	680	661	624	621	576	563	608	551	531	566	558	509	530	481	490	422	380
Adjusted supply of milk	....	782	782	739	718	678	675	626	612	608	600	577	566	558	553	530	523	490	460	413

Handicap.—E. M. Webb, 782 — 1 = 781 ; A. Cunningham, 782 — 5 = 777 ; E. Rosher, 739 — 15 = 724.

TABLE II.

POINTS GAINED BY COMPETITORS IN ZONE 2—BUNBURY-DONNYBROOK. Judge A. Sharp.

	Maximum Points.	J. H. Bensted & Co.	B. W. H. Brett.	R. C. Benson.	J. Jarvis.	A. C. Frost.	A. & R. Poad.	Mrs. M. A. Crute.	E. W. M. Trigwell.	J. P. Norton.	E. F. S. Draper.	G. Anderson.	J. A. D. Keall.
1.—*Conservation of Fodder and Summer Fodder Crop* (300 Points)—													
(a) Hay, quality condition	40	30	35	30	30	27	30	26	35	35	36	30	....
(b) Baling	10	10	10	10	....	10	10	....	....	10	10	10	....
(c) Silage, quality, type, wastage	25	....	....	....	....	....	....	....	....	....	....	....	....
(d) Summer fodder crops, cultivation, disease, yield	25	15	....	20	16	....	15	17	16	....	....	....	15
(e) Amount conserved per cow	200	200	200	200	200	200	140	132	112	80	140	100	33
2.—*Pastures* (240 Points)—													
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	90	117	100	102	95	93	88	89	93	88	110	110
(b) Management, fertilisation	100	80	90	80	85	80	80	75	75	80	80	85	80
3.—*Dairy Herd* (120 Points)—													
(a) Dairy type	50	30	24	19	25	15½	16	20	28	15	15	16	14
(b) Condition	20	18	18	19	18	18	17	18	18	19	17	17	18
(c) Freedom from disease	20	19	16	19	20	16	18	18	16	18	20	20	19
(d) Herd Sire (1) Pure bred	20	19	18	18	....	18	18	19	19	18	18	18	18
(2) *Ex* tested dam	10	10	7	6	....	....	....	8	8	....	9	....	6
4.—*Returns per Acre* (120 Points)—													
(a) Butterfat.....lb. per acre	100	45	31	54	47	45	37	31	47	41	23	38	35
(b) Sidelines (pigs, poultry, vegetables, etc.) £..... per acre	20	8	8	3	6	8	4	7	5	16	4	2	12
5.—*Pigs* (30 Points)—													
(a) Breed, type and condition	10	8	9	8	9	8	9	8	8	8	9	....	9
(b) No. of breeding sows in proportion to milch cows	10	8	9	8	8	7	8	5	8	9	9	....	10
(c) Housing, feeding and management	10	8	8	7	9	8	8	8	7	6	8	4	10
6.—*Farm Management* (140 Points)—													
(a) Lay-out convenience, etc.	50	45	45	40	30	45	35	40	30	35	30	30	40
(b) Sanitation :													
(i) General	30	25	27	25	25	25	25	25	25	20	25	25	25
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	35	30	36	40	35	40	35	35	25	30	25	40
(c) Book-keeping and records	40	20	16	17	17	18	15	20	16	18	4	5	16
7.—*Utilisation of Skim Milk* (50 Points)—													
Based on number of pigs and calves fed	50	46	50	16	32	12	28	32	32	50	20	28	34
Total	1,000	769	768	735	719	690	646	632	629	596	595	566	544

Handicap.—J. H. Bensted, 769 — 10 = 759; R. C. Benson, 735 — 15 = 720; A. C. Frost, 718 — 5 = 713.

TABLE III.

POINTS GAINED BY COMPETITORS IN ZONE 3—BUSSELTON-MARGARET RIVER. Judge A. Sharp.

	Maximum Points.	G. S. Blaikie.	A. Miller.	N. A. Smith.	W. D. Patmore.	F. Tarchini.	H. Pickering.	A. Fisher	F. L. Torrent.	G. M. Smith & Sons.	C. G. Armstrong.
1.—*Conservation of Fodder and Summer Fodder Crop* (300 Points)—											
(a) Hay, quality condition	40	36	30	38	32	36	32	36	30	33	30
(b) Baling	10	....	8	10	10	....	....	....	7	10	....
(c) Silage, quality, type, wastage	25	....	....	....	....	....	....	....	....	....	....
(d) Summer fodder crops, cultivation, disease, yield	25	....	....	....	12	....	....	....	10	12	....
(e) Amount conserved per cow	200	200	200	200	160	140	90	64	80	70	50
2.—*Pastures* (240 Points)—											
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	130	125	118	127	100	113	110	110	102	105
(b) Management, fertilisation	100	85	80	84	84	75	80	76	75	65	78
3.—*Dairy Herd* (120 Points)—											
(a) Dairy type	50	27	23	14	14	16	21	17	15	12	16
(b) Condition	20	19	20	19	18	18	17	17	19	17	17
(c) Freedom from disease	20	18	18	17	17	18	15	20	17	18	19
(d) Herd Sire (1) Pure bred	20	18	19	19	18	19	18	....	18	18	19
(2) *Ex* tested dam	10	8	6	8	10	....	8	....	....	....	9
4.—*Returns per Acre* (120 Points)—											
(a) Butterfat.....lb. per acre	100	59	52	19	20	25	29	48	43	23	25
(b) Sidelines (pigs, poultry, vegetables, etc.) £..... per acre	20	5	5	6	6	3	3	9	12	12	4
5.—*Pigs* (30 Points)—											
(a) Breed, type and condition	10	8	8	8	8	8	8	7	....	8	9
(b) No. of breeding sows in proportion to milch cows	10	....	2	8	....	5	8	....	....	8	8
(c) Housing, feeding and management	10	7	7	8	8	8	6	8	....	7	8
6.—*Farm Management* (140 Points)—											
(a) Lay-out convenience, etc.	50	42	37	35	35	40	35	33	40	38	40
(b) Sanitation :											
(i) General	30	25	25	26	25	25	25	25	25	25	26
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	36	30	36	30	30	33	35	25	25	35
(c) Book-keeping and records	20	15	15	16	15	15	17	8	14	16	15
7.—*Utilisation of Skim Milk* (50 Points)—											
Based on number of pigs and calves fed	50	38	26	44	42	34	40	50	20	28	28
Total	1,000	776	736	733	691	615	598	563	560	547	541

Handicap.—F. L. Torrent, 560 — 1 = 559.

TABLE IV.

POINTS GAINED BY COMPETITORS IN ZONE 4—BRIDGETOWN. Judge C. D. Sharp.

	Maxmum Points.	S. C. Maidment.	H. A. Dowerick.	M. Brennan.	H. S. & E. D. Moyes.	F. J. Smith.	K. Chapman.	C. N. Warren.	G. White.	L. Faulkner.	H. H. Daniels.	L. J. Piper.	J. C. Williams.	G. Henderson.	J. Falconer.	V. R. Meagher.
1.—*Conservation of Fodder and Summer Fodder Crop* (300 Points)—																
(a) Hay, quality condition	40	36	36	35	34	34	35	33	34	34	30	34	30	35	31	....
(b) Baling	10	10	10	10	10	10	....	8	10	10	....	....	10	....	10	....
(c) Silage, quality, type, wastage	25	25	....	....	....	....	....	20	....	....	....	....	....	....	....	....
(d) Summer fodder crops, cultivation, disease, yield	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
(e) Amount conserved per cow	200	184	200	136	130	150	168	88	88	120	96	120	80	48	48	....
2.—*Pastures* (240 Points)—																
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	120	125	110	100	105	108	95	120	103	90	85	94	98	88	112
(b) Management, fertilisation	100	95	80	80	75	75	72	70	82	74	75	68	65	70	70	76
3.—*Dairy Herd* (120 Points)—																
(a) Dairy type	50	20	25	28	16	18	18	15	17	18	15	14	18	13	13	14
(b) Condition	20	18	19	19	18	18	19	19	18	18	17	17	18	18	17	18
(c) Freedom from disease	20	17	18	19	18	17	17	18	18	17	17	17	19	18	17	17
(d) Herd Sire (1) Pure bred	20	18	20	18	18	18	18	18	18	13	18	17	....	15	14	15
(2) *Ex* tested dam	10	9	10	10	10	8	8	7	7	....	....	4	....	....	4	2
4.—*Returns per Acre* (120 Points)—																
(a) Butterfat.....lb. per acre	100	30	31	65	26	17	21	27	45	26	30	16	31	40	22	59
(b) Sidelines (pigs, poultry, vegetables, etc.) £..... per acre	20	7	10	2	8	2	4	4	....	6	3	3	3	2	3	5
5.—*Pigs* (30 Points)—																
(a) Breed, type and condition	10	7	....	....	7	6	....	7	....	6	7	....	7	....	7	.
(b) No. of breeding sows in proportion to milch cows	10	8	.	.	10	5	.	1	.	4	8	.	9	.	6	2
(c) Housing, feeding and management	10	7	.	.	7	7	2	6	.	5	7	..	7	..	6	4
6.—*Farm Management* (140 Points)—																
(a) Lay-out convenience, etc.	50	42	40	35	38	37	36	30	36	30	31	34	40	32	28	30
(b) Sanitation :																
(i) General	30	26	25	25	22	24	24	24	23	24	23	23	25	24	25	24
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	36	32	32	28	34	32	30	31	31	32	32	36	32	30	30
(c) Book-keeping and records	20	20	18	15	16	16	12	16	15	12	15	15	18	13	16	12
7.—*Utilisation of Skim Milk* (50 Points)—																
Based on number of pigs and calves fed	50	50	20	10	50	34	24	40	9	16	32	31	35	24	16	10
Total	1,000	785	719	649	641	635	618	576	571	567	546	546	545	482	471	430

Handicap.- S. C. Maidment, 785 — 15 = 770; H. A. Dowerick, 719 — 10 = 709; M. Brennan, 649 — 5 = 644; F. J. Smith, 635 — 1 = 634.

TABLE V.

POINTS GAINED BY COMPETITORS IN ZONE 5—MANJIMUP-NORTHCLIFFE. Judge J. T. McNally.

	Maximum Points.	J. Bashford.	W. Della.	R. E. Dorrell.	A. J. S. Augel.	L. DeCampo.	J. J. Littlefair.	B. A. Rice.	C. McElhone.
1.—*Conservation of Fodder and Summer Fodder Crop* (300 Points)—									
(a) Hay, quality condition	40	36	34	32	35	37	35	36	36
(b) Baling	10	....	....	10	....	....	10	10	....
(c) Silage, quality, type, wastage	25	....	....	....	17	....	....	....	....
(d) Summer fodder crops, cultivation, disease, yield	25	....	....	....	1	....	16	....	....
(e) Amount conserved per cow	200	200	200	180	200	185	133	200	200
2.—*Pastures* (240 Points)—									
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	115	102	105	80	113	100	100	109
(b) Management fertilisation	100	90	80	80	60	90	75	80	80
3.—*Dairy Herd* (120 Points)—									
(a) Dairy type	50	22	25	23	28	15	15	16	15
(b) Condition	20	20	20	20	20	20	20	20	20
(c) Freedom from disease	20	20	15	20	20	19	12	15	20
(d) Herd Sire (1) Pure bred	20	20	20	20	20	20	20	20	....
(2) *Ex* tested dam	10	2	10	6	7	....	10	....	....
4.—*Returns per Acre* (120 Points)—									
(a) Butterfat.....lb. per acre	100	56	55	45	36	31	22	19	23
(b) Sidelines (pigs, poultry, vegetables, etc.) £..... per acre	20	7	18	1	11	20	6	10	2
5.—*Pigs* (30 Points)—									
(a) Breed, type and condition	10	10	8	8	9	....	10	10	....
(b) No. of breeding sows in proportion to milch cows	10	10	5	....	2	....	9	1	....
(c) Housing, feeding and management	10	9	6	8	7	1	9	7	....
6.—*Farm Management* (140 Points)—									
(a) Lay-out convenience, etc.	50	45	30	45	33	40	45	30	40
(b) Sanitation :									
(i) General	30	27	20	30	26	25	28	20	30
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	37	20	40	35	30	35	25	35
(c) Book-keeping and records	20	20	15	20	20	15	20	15	10
7.—*Utilisation of Skim Milk* (50 Points)—									
Based on number of pigs and calves fed	50	50	34	19	45	24	50	22	3
Total	1,000	796	717	712	712	685	680	656	623

Handicaps.—J. Bashford, 796 — 15 = 781 ; A. J. S. Angel, 712 — 10 = 702 ; R. E. Dorrell, 712 — 5 = 707.

TABLE VII.

POINTS GAINED BY COMPETITORS IN ZONE 7—SOUTH COASTAL. Judge I. Miller.

	Maximum Points.	W. Middleton.	L. P. Joyce.	B. P. Zimmerman.	F. Pease.	L. Jordan.	W. L. Bradford.	L. Tysoe.	W. J. Bennetts & Son.	Cluett & Sons.	E. W. Poole.	G. E. Hill.	T. C. Cooper.	G. Killick.	J. J. Joyce.	E. Mullaly.	G. Smith.
1.—*Conservation of Fodder and Summer Fodder Crop* (300 Points)—																	
(a) Hay, quality condition	40	36	37	34	37	33	35	33	34	32	32	34	38	34	....	....	....
(b) Baling	10	10	....	10	....	10	10	5	10	10	1	....	....	10	....	....	....
(c) Silage, quality, type, wastage	25	....	....	....	20	....	....	....	....	....	....	....	....	....	....	....	....
(d) Summer fodder crops, cultivation, disease, yield	25	....	21	23	22	....	....	23	....	....	21	....	....	....	20	22	....
(e) Amount conserved per cow	200	200	200	130	142	196	92	106	1.8	88	88	146	26	88	60	19	...
2.—*Pastures* (240 Points)—																	
(a) Density, condition, freedom from weeds, mixture, drought resistance, etc.	140	130	115	128	127	115	129	117	114	111	100	109	110	106	102	112	112
(b) Management fertilisation	100	94	80	93	92	87	91	80	80	84	65	84	75	78	66	87	88
3.—*Dairy Herd* (120 Points)—																	
(a) Dairy type	50	33	21	25½	25	16	18½	15½	20	15	15	13½	16½	12½	17½	12	14
(b) Condition	20	18	18	18½	18	17	18	18	18	17	17	16½	17½	16½	16½	18½	17
(c) Freedom from disease	20	19	19	19	19	18	19	19	20	18	17	....	20	18	18	19	18
(d) Herd Sire (1) Pure bred	20	19	19	19	19	19	19	19	....	18½	19	....	15	19	19	15	....
(2) *Ex* tested dam	10	9	..	6	7	7	9	9	....	7	....	....	....	....	7	....	....
4.—*Returns per Acre* (120 Points)—																	
(a) Butterfat.....lb. per acre	100	61	39	50	47	26	44	23	54	22	29	16	52	34	40	17	33
(b) Sidelines (pigs, poultry, vegetables, etc.) £..... per acre	20	5	7	5	7	3	7	3	4	6	3	....	4	3	2	4	4
5.—*Pigs* (30 Points)—																	
(a) Breed, type and condition	10	9	9	9	9	8	9	9	8	8	9	....	8	....	9	9	....
(b) No. of breeding sows in proportion to milch cows	10	8	10	9	8	....	8	5	....	....	10	....	8	....	10	8	....
(c) Housing, feeding and management	10	8	9	9	8	8	8	7	9	8	8	8	7	7	8	8	....
6.—*Farm Management* (140 Points)—																	
(a) Lay-out convenience, etc.	50	43	42	45	37	35	36	39	45	38	34	38	35	38	40	40	40
(b) Sanitation :																	
(i) General	30	26	28	27	24	25	25	26	30	25	20	26	24	26	20	27	27
(ii) Milking shed, dairy, dairy utensils, and care of cream and milk	40	36	38	38	30	30	33	30	38	22	25	30	30	20	20	36	33
(c) Book-keeping and records	20	16	18	16	15	15	16	16	17	15	15	17	15	14	15	14	19
7.—*Utilisation of Skim Milk* (50 Points)—																	
Based on number of pigs and calves fed	50	50	50	30	32	50	48	48	19	50	40	22	44	18	40	50	29
Total	1,000	830	780	745	735	718	675	650	648	595	568	560	545	542	530	518	434

Handicaps.—W. L. Bradford, 675 — 15 = 660; F. Pease, 735 — 10 = 725; L. Tysoe, 650 — 1 = 649.

TABLE VI.

Points Gained by Competitors in Zone 6—Great Southern. Judge R. E. McCallum.

		Miss I. Kelliher.	Messrs. deHoughton and Kennedy.	R. Kevern.
Fodder Conserved per Dairy Cow—	100 points			
Oaten Hay (Sheaf)		30	54	....
Meadow Hay (baled)		20	....	50
Meadow Hay (loose)		....	2	....
Hay, Quality and Condition—	50 points			
Mixture	20	15	15	18
Type and Palatability	10	6	7	9
Time of Cutting	10	9	8	10
Aroma	5	3	3	5
Baling	5	4	3	....
Use of Phosphatic Supplements—	25 points	20	15	10
Silage or Summer Fodder Crops—	50 points	....	....	....
Sanitation of Dairy Premises—	25 points			
Drainage	5	3	4	5
Cleanliness of Utensils	5	5	4	5
Provision of Boiling Water	5	5	5	4
General Hygiene	5	5	4	4
General Layout	5	5	4	4
Total	250	130	128	124

As in past years a good deal of material has been obtained by the judges in the course of the present competition, which is of much interest and value not only to the competitors but to dairy farmers generally. The following discussion and comment on the various sections is intended to draw attention to the results being obtained by the more efficient farmers who entered the competition, and to indicate what has been proven by experience to be good dairy farm practice.

CONSERVATION OF FODDER.

The main purpose of the Better Dairying Competition is to draw attention to efficient dairy farm practices, and in framing the system of judging full realisation was given to the need for adequate feed either in the form of pasture, crops or reserves of hay and silage. These sections are allotted 52 per cent. of the total points.

Under normal climatic conditions in Western Australia supplementary feeding in the form of hay, silage and summer fodder crops is necessary for from 5–6 months each year in order to secure maximum economical returns from the dairy herd.

As annual pastures have reached maturity by December it is necessary to provide additional feed preferably in the form of summer fodder crops or silage to provide a succulent ration. Such feeding is desirable well into the summer months if production is to be maintained and in the case of early autumn calving cows, which have completed lactation, is equally important so that they may calve down again in good rising condition to ensure high productions in the following lactation.

Further, in the late autumn or early winter, at the break of the season, and commencement of pasture growth adequate reserves of hay are an absolute necessity. At this period the dry feed in the paddock is of little account and pasture growth is short and generally slow with the onset of lower tempera tures.

In normal years pasture growth is insufficient for maintenance and maximum milk production until the end of July or into August. This is a critical period as the majority of cows are mated to calve by this time and sufficient food must be available to allow of the animals producing to capacity. Dairy farmers generally are only too well informed regarding the difficulty of bringing a cow back to full production once she has been allowed to fall back due to short rations after calving.

Allowance must also be made for the stock other than milking cows on the farm. It is necessary to provide something better than mere maintenance rations for working horses, bulls and young growing stock intended as replacements. The total quantity of reserves, expressed in hay equivalent, whether conserved as fodder crops, silage or hay should amount to 2½ tons per milking cow to gain maximum points. Where substantial areas of irrigated pasture, or naturally growing summer moist pasture were available the above figure of 2½ tons was reduced according to a scale advised to all judges.

TABLE VIII.

Fodder Reserves—Comparison of Zones and Winners in each Zone.

Zone.	Total cows.	Hay.	Silage.	Green Fodder.	Reserve per cow.			Reserve per cow calculated as hay.
					Hay.	Silage.	Green Fodder.	
		Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1. Coastal	972	1,031	412	722	1.06	0.42	0.74	1.45
E. M. Webb	20	20	17	27.5	1.00	0.85	1.37	1.74
2. Bunbury-Donnybrook	397	596	....	385	1.50	....	0.97	1.28
B. W. H. Brett	36	90	....	98	2.50	....	....	2.50
3. Busselton-Margaret River	306	436	....	47	1.42	....	0.15	1.47
G. S. Blaikie	30	51	....	....	1.70	....	....	1.70
4. Bridgetown	467	593	70	22	1.27	0.15	0.05	1.34
S. C. Maidment	50	93	70	....	1.86	1.40	....	2.33
5. Manjimup-Northcliffe	228	440	65	19	1.93	0.29	0.08	2.06
J. Bashford	30	64	....	....	2.13	....	....	2.13
7. South Coastal	378	361	45	226	0.95	0.12	0.60	1.19
W. Middleton	18	45	....	....	2.50	....	....	2.50
Above Zones, 1949–50	2,748	3,477	592	1,421	1.27	0.22	0.52	1.52
6. Great Southern	86	111	....	....	1·30	....	....	1·30
de Hoghton & E. Kennedy	22	31	....	....	1.41	....	....	1.41
All Zones, 1949–50	2,834	3,588	592	1,421	1.27	0.22	0.52	1.52

TOTAL QUANTITY CONSERVED.

Over all entrants in the seven zones the average reserves per milking cow were:—

Hay	1.27 tons
Silage	0.22 tons
Summer Fodders	0.52 tons

Converted to hay the above is equivalent to 1.52 tons (3 tons of silage or summer fodder being equivalent to 1 ton hay). This is the same figure as in last year's competition. However in the competition under review more fodder was conserved as hay and rather less both in the form of silage and summer fodders.

Table VIII shows the average quantities conserved in each zone, and the amount conserved by the ultimate winner in each zone. Some explanation is necessary here as in the case of Messrs. Webb, Blaikie and Bashford full points were gained in the section, due to the fact that irrigated or summer growing pasture was available to the stock.

The Manjimup-Northcliffe zone had the highest average with 2.06 tons, as compared to 1.28 tons in the previous year. Zones 2, 4 and 5 also increased average reserves over 1948-49, whilst the other zones showed a decline on the previous year.

The following farmers gained maximum points for conserved fodder indicating that the target set of 2½ tons is not excessive, as in several cases this figure was exceeded. It is significant also that these farmers also scored high in the sections, production per cow and per acre.

Zone 1.—E. M. Webb, Cookernup; A. Cunningham, Armadale.

Zone 2.—B. W. H. Brett, Dardanup; J. H. Bensted and Co., Dardanup; R. C. Benson, Kirup; J. Jarvis, Donnybrook; A. C. Frost, Donnybrook.

Zone 3.—G. S. Blaikie, Cowaramup; A. Miller, Cowaramup; N. A. Smith, Margaret River.

Zone 4.—H. A. Dowrick, Mullalyup.

Zone 5.—J. Bashford, Northcliffe; W. Della, Eastbrook; A. J. S. Angel, Jardee; B. A. Rice, Manjimup; C McElhone, Yanmah

Zone 7.—W. Middleton, Denmark; L. P. Joyce, Torbay.

The quantity of hay conserved per cow was slightly higher than in the previous year's competition, but is still well below the desired quantity. It is important for farmers to plan in advance for hay reserves, and such planning requires good pasture management in order to allow sufficient paddocks to be shut up for silage or hay cutting or both; and also a close check on stocking capacity.

The Manjimup-Northcliffe zone returned the good figure of 1.93 tons of hay per cow, or 0.83 tons in excess of the 1948-49 figure.

In general the quality of hay conserved was good, being cut at the right stage to secure maximum nutrients, and cured in a satisfactory manner with a good colour and aroma Some entrants lost in quality where the hay lay in paddocks for excessive periods awaiting contract balers to come in and do the work.

The quantity of fodder conserved as silage is lower again than was the case in 1948-49 and surely indicates that this form of conservation is rapidly going out of favour. Only 0.22 tons per cow was put away as compared to 0.28 tons in 1948-49 and 1.71 tons in the 1931-32 competition. Each year the quantity has dropped, till at the present time the art is almost lost. The lack of suitable labour appears to be the chief reason operating against greater quantities of silage being made, and this in the immediate future is only likely to be offset by the provision of more modern harvesting and stacking equipment.

Summer growing fodder crops also showed a smaller tonnage per cow in comparison to 1948-49, but this is accounted for by the hot, dry conditions prevailing last summer resulting in decreased yields generally.

TABLE IX.

Acreage of Green Fodder per Cow.

Zone.	No. of Cows.	Summer Fodder, acres.	Acres sown per cow.
1. Coastal	972	148.0	0.15
2. Bunbury-Donnybrook	397	83.5	0.21
3. Busselton-Margaret River	306	9.0	0.03
4. Bridgetown	467	7.5	0.02
5. Manjimup-Northcliffe	228	2.75	0.01
7. South Coastal	378	13.0	0.03
Total	2,748	263.75	0.10

As will be seen from Table IX only small acreages have been sown in any of the zones. The best result is returned in the Bunbury Donnybrook area where an average of 0.21 acres per cow was sown.

It is realised that not all farms have areas suitable for the growing of these crops, but many farms have, where highly profitable crops can be grown when the necessary prior preparation is given. In this regard it must be realised that early ploughing, cultivation, seeding and adequate fertilisation is an absolute necessity for good results.

With an average yield of approximately 10 tons per acre which is to be expected normally it is good farming practice to sow at least ¼ acre per milking cow in order to provide adequate succulent feed during the summer months. The acreages in Table IX show that this figure was nearly approached in only one of the six zones.

Table VIII shows that the tonnage of silage conserved was well below the optimum considered necessary in all zones. This together with the low quantity of green fodder has resulted in a totally inadequate provision of succulent feed, and could be largely responsible for the short lactation periods and low yields as disclosed by Grade Herd Recording results.

In Table X hereunder is set out the acres sown in each zone to the various types of sumer fodders. From this it will be seen that by far the most popular crops are Sudan grass and millet. These crops require little more attention than ordinary pasture species other than more careful attention to grazing. There has been a slight increase in the acreage sown to lucerne, and it is hoped that this trend will continue in the future. The value of this plant lies in its high protein content which is of such importance when pasture species have reached maturity.

TABLE X.

Kinds and Acres of Green Feed.

Kind of Feed.	Zone.						Total Acres.
	1	2	3	4	5	7	
Maize	7¼	4	....	....	....	11.5	22.75
Sorghum	20	....	....	0.5	....	....	20.5
Sudan	64	55½	....	....	2.75	....	122.25
Millet	32	22	2½	....	....	....	56.5
Lucerne	13	....	6½	7	....	0.5	27.0
Melons	18	2	....	....	....	....	20.0
Mangels	....	....	....	....	....	1	1.0

PASTURES.

A. *General.*

In all zones the main pasture constituent is subterranean clover either mid-season or late variety. Judges generally have referred to the necessity for the incorporation of perennial species such as Phalaris tuberosa, Perennial rye grass and Kikuyu, particularly on those farms where conditions are not suitable for the growing of summer fodders.

Where growth of the above named species is encouraged a longer period of green grazing is assured. Such species will have a longer growing period into the summer months, after the annual species have reached maturity, and will come away to give a "bite" much earlier with the first rains.

Happily more attention is being paid to the establishment of an annual grass in association with sub-clover, and Wimmera rye is being utilised more generally, with the result that from the nutrition angle a much better balanced pasture results, and hay yields are likely to be improved. This also applies of course where the perennial species are grown.

The judges report that the leading farmers in general make full use of the pasture harrows especially to spread and break animal droppings, but that this practice could with benefit be more widely practiced throughout the dairying areas.

Some difficulty has been experienced by most farmers in obtaining their full requirements of superphosphate in recent years, and this has had the effect of established pastures receiving less than the recommended dressing of 2 cwt. per acre. In fact experiments at present in progress suggest that in the lower south-western areas a quantity in excess of this is required for optimum economic pasture production.

B. *Carrying Capacity.*

This is of prime importance as it controls the quantity of produce that is produced on the farm measured in terms of yield per acre. Stocking concentration is not a good measuring stick, as one of the most common forms of poor farm management is seen in overstocking, invariably resulting in over-all decreased gross returns.

The level of farm management is inseparably linked with carrying capacity particularly in relation to fertiliser practice, cultural treatment, grazing methods and fodder conservation.

TABLE XI.

Acres Utilised per Milch Cow.

	Average No. of Cows in Herd.					Acres Devoted to Dairying.					Acres per Cow.				
	1949-50.	1948-49.	1935-36.	1934-35.	1933-34.	1949-50.	1948-49.	1935-36.	1934-35.	1933-34.	1949-50.	1948-49.	1935-36.	1934-35.	1933-34.
Zone 1	51	51	36	41	36	234	212	172	89	124	4·6	4·1	4·7	4·5	3·6
Zone 2	33	34	56	29	36	136	140	213	118	245	4·1	4·1	3·8	3·8	6·8
Zone 3	31	33	22	23	21	154	146	100	93	91	5·0	4·3	4·5	4·0	5·8
Zone 4	31	36	32	22	26	157	194	154	125	134	5·0	5·3	4·8	5·4	5·3
Zone 5	28	43	24	21	22	133	125	86	77	85	4·7	3·1	3·6	3·6	4·2
Zone 7	24	26	....	20	18	105	122	....	89	55	4·4	4·7	....	4·4	3·0
Average	34·3	37·0	33·5	27·7	26·3	159·0	163·5	144·1	118·6	126·7	4·6	4·4	4·3	4·1	4·7

Table XI shows the acres utilised per milch cow in each of the six zones, compared with some of the other years in which similar competitions have been held. Over the years since 1933 little variation has occurred in the stocking concentration per acre.

In zone 5 the figure has risen from 3.1 acres per cow in 1948-49 to 4.7 acres in 1949-50. The judge in this zone explains this by pointing out that in the current competition there were twice as many competitors, and many of the entrants had recently enlarged their pasture areas, which were not yet producing near the level of the older established swards.

The table also shows that the number of acres devoted to dairying has decreased slightly from 163.5 acres in 1948-49 to 159 whilst the average number of cows has decreased from 37.0 to 34.3 with a consequent rise in acres per cow from 4.4 to 4.6.

The number of cows per herd in each zone remains much the same as in the previous year with the exception of zone 5 where a drop from 43 cows to 28 has been recorded. Again this is due to the larger number of entrants in this zone, the newcomers having smaller herds whilst several farmers with larger numbers had not entered in this competition, although in the previous one.

Data collected from all farms show the numbers of the various classes of stock as below—

Cows (milking and dry)	2,748
Heifers	1,037
Calves	1,382
Bulls	80
Horses	176
	5,423

Table XI gives the carrying capacity as 4.6 acres per cow, whilst the figures above show the carrying capacity as 2.3 acres per head of all classes of stock. In terms of equivalent of large stock the figure is calculated at 3.5 acres.

DAIRY HERDS AND PRODUCTION .

The allocation of points in this section was materially altered from the basis in operation in previous years.

Dairy type previously was judged solely on the basis of visual examination of the herd, but for the competition under review type was related directly to production per cow. The full allotment of 50 points in this section was awarded those herds producing 400 lb. of fat or more per cow, with a consequent lesser number of points to herds with lower production according to a scale furnished to each judge.

In the following tables information is given concerning the production per cow in the various zones, in the leading herds, and the production per acre also, as a measure of the quality of the herds and their management—

Table XII.

Average Yield per Cow.

Year.	Number of Cows.	Average Yield per Cow, lb. butterfat.
1949–50	2,748	237.6
1948–49	1,964	232.9
1935–36	2,109	212.0
1934–35	1,550	192.7
1933–34	1,663	208.8
1932–33	1,531	201.5

As can be seen from the table the average yield over all entrants is the highest on record being 4.7 lb. higher than in 1948-49. This is a pleasing feature as it indicates an improvement both in herd quality and management. The number of cows also is very much greater than in any previous year.

Table XIII gives the average production per cow in each zone together with that of the highest producing herd in each zone.

Table XIII.

Average Production per Cow in each Zone together with that of the Highest Producing Herd.

Zone.	Total Number of Cows.	Average per herd.	Average butterfat lb. per Cow.	48–49.	35–36.
1. Coastal	972	51	238.2	270	233.4
A. Cunningham	....	48	374	....	....
2. Bunbury-Donnybrook	397	33	244.1	203.8	205.0
J. H. Bensted & Co.	20	....	321	....	....
3. Busselton-Margaret River	306	31	241.7	235.8	260.0
G. S. Blaikie	....	30	307	....	....
4. Bridgetown	467	31	231.8	220.8	229.1
M. Brennan	....	30	306	....	....
5. Manjimup-Northcliffe	228	28	244.3	214.3	179.6
W. Della	....	29	295	....	..
7. South Coastal	378	24	229.1	214.4	...
W. Middleton	....	18	346	....	..
Average all Zones	2,748	34.3	237.6	232.9	212.0

In all zones there is a big difference in production comparing the leading herd and the average of all herds. Obviously there is considerable room for improvement of yield on a number of the dairy farms entered.

Mr. A. Cunningham, Armadale, in Zone 1 returned the highest yield per cow. This herd is predominantly Friesian, a proportion being pure bred animals. The herd is used for milk production and fed on a high plane of nutrition. Good pasture is the basis of the ration supplemented with oaten and meadow hay, silage and summer fodder crops, and a small acreage of lucerne, together with concentrates fed in the bails. Mr. Cunningham received full points for fodder conservation as he conserved the equivalent of 3¼ tons of hay per milking cow. Another high yield was in the herd of J. H. Bensted and Co., Dardanup in Zone 2. This is a pure bred A.I.S. herd which produced an average of 321 lb. of fat, the produce being forwarded as cream to the butter factory. As in the case of Mr. Cunningham, this herd is well provided for in the matter of pasture, hay, both cereal and meadow, and summer fodders. No natural summer grazing is available and no silage is conserved.

In Zone 7 Mr. W. Middleton's herd of high class Jerseys averaged 346 lb. of fat. There is only 65 acres of pasture on this property all on karri hillside country, but with judicious stocking and an excellent growth of well balanced pasture, plus reserves of 2½ tons of baled meadow hay per cow, high production has been achieved. There is little or no summer grazing and no fodder crops grown or silage conserved.

TABLE XIV.

Herds Producing More than 250 lb. Butterfat per Cow, 1949–50.

Owner.	Zone.	No. of Cows in Herd.	Production of lb. Butterfat per Cow.
A. Cunningham	1	48	374
W. Middleton	7	18	346
J. H. Bensted	2	20	321
E. W. M. Trigwell	2	36	313
G. S. Blaikie	3	30	307
M. Brennan	4	30	306
B. P. Zimmerman	7	29	306
W. Pethwick	1	49	304
J. Jarvis	2	20	297
W. Della	5	29	295
B. W. H. Brett	2	36	291
L. P. Joyce	7	13	284
H. A. Dowerick	4	29	282
A. Miller	3	32	282
A. J. S. Angel	5	36	281
S. C. Maidment	4	50	281
R. E. Dorrell	5	30	280
E. Rosher	1	76	278
J. Bashford	5	30	276
H. Pickering	3	20	271
W. J. Bennetts & Son	7	25	269
W. L. Bradford	7	20	267
T. Abbott	1	34	266
M. A. Crute (Mrs.)	2	26	264
Kentish Bros.	1	125	257
R. C. Benson	2	30	256
J. E. Murray	1	27	254
J. J. Joyce	7	15	251

The above table sets out the herds producing more than 250 lb. of fat. In the 1948-49 competition 16 herds figured in this table, seven of which produced over 300 lb., whilst in the current competition 28 herds are listed, eight of these giving over 300 lb.

As the majority of entrants in Zone 1 are whole milk producers who measure the performance of their herds in terms of gallons of milk rather than pounds of butterfat Tables XV and XVI have been compiled for the benefit of those farmers.

Table 15 gives the total and average yield in gallons and clearly demonstrates that high yields per cow are being obtained by farmers in the milk zone. The performance of the first five competitors is highly commendable, and is evidence of the skill of these farmers in the business of dairy farming.

TABLE XV.

Herds Supplying Whole Milk, Zone 1—Average Yield of Milk per Cow.

Name.	Cows.	Total Yield.	Average Yield.
		Gallons.	Gallons.
A. Cunningham	48	44,968	937
W. Pethwick	49	37,244	760
E. Rosher	76	52,742	694
Kentish Bros.	125	80,266	642
S. Mullins	65	40,730	627
J. E. Murray	27	16,076	595
E. M. Webb	20	11,780	589
J. Pailthorpe	65	37,715	580
Leaver & Sons	90	48,785	542
E. C. Craighill	61	31,692	519
W. A. Ward	36	18,254	507
L. M. Temple	50	25,060	501
J. England	60	28,073	468
R. O. Briggs	70	30,253	432
D. K. Watts	26	9,762	375
Total for Zone	868	513,400	5,915

A comparison of yields in Zone 1 is given in Table XVI. Although the figure shows a decrease of 83 gallons per cow on 1948-49 it is the second highest recorded production in these competitions.

TABLE XVI.

Coastal—Zone 1.—Average Yield of Milk (gallons) per Cow.

Year.	Average Yield.
1949–50	592
1948–49	675
1935–36	583*
1934–35	540*
1933–34	552*
1932–33	414*

* Converted from Butterfat averages, as published for earlier competitions, to a four per cent. milk.

Production per Acre.

In Table XVII is given the average yields in the various zones, compared with the leading farm. The average over all farms has fallen slightly below the figure of 52.6 recorded in 1948-49. Zones 2, 4 and 7 have recorded an increase over that year whilst the other zones have dropped back slightly. The highest improvement was recorded in Zone 2 from 49 lb. in 1948-49 to 59.4, an increase of over 10 lb. per acre.

The highest production per acre was again recorded by Mr. E. Rosher, Bassendean, with the high return of 157 lb. This is below the figure of 172 lb. recorded by him in the previous year. The decrease is due entirely to the fact that further land has been acquired in the interim which generally speaking is not as yet as highly productive as the land which has been owned for a longer period. Actually Mr. Rosher has increased his herd in the 12 months period from 65 head to 76, his total production has gone up considerably, and the average per cow increased from 633 gallons to 694, yet there is a decrease in the per acre return. This return of 157 lb. is equivalent to 392 gallons per acre on the basis of a 4 per cent. fat milk.

TABLE XVII.

Average Production of Butterfat per acre compared with that of the Leading Farm in this Respect.

Zone.	Average acres used for Dairying.	Average number Cows each farm.	Butterfat Produced, per acre—lb.						
			1949–50	1948–49	1935–36	1934–35	1933–34	1932–33	1931–32
1. Coastal	234	51	52.0	64.5	48.9	47.0	61.6	34.8	53.4
E. Rosher	....	....	157	....	....	....	....	....	....
2. Bunbury-Donnybrook	136	33	59.4	49.0	54.1	57.7	32.8	46.6	50.4
R. C. Benson	....	....	....	85	....	....	....	....	....
3. Busselton-Margaret River	154	31	48.0	53.2	57.3	54.9	46.6	43.6	37.9
G. S. Blaikie	....	....	92	....	....	....	....	....	....
4. Bridgetown	157	31	45.9	41.6	56.0	42.9	35.7	40.7	35.1
M. Brennan	....	....	100	....	....	....	....	....	....
5. Manjimup-Northcliffe	133	28	52.4	66.3	49.7	49.0	46.0	38.8	35.5
J. Bashford	....	....	87	....	....	....	....	....	....
7. South Coastal	105	24	51.5	45.7	....	58.1	70.0	49.4	45.4
W. Middleton	....	....	96	....	....	....	....	....	....
Average all Zones	159	34.3	51.3	52.6	50.3	48.6	43.8	42.6	43.0

Both Mr. R. C. Benson, Kirup, in Zone 2 and Mr. M. Brennan, Balingup, in Zone 4 again returned the highest yield per acre in their zones Mr. Benson's figure was slightly below the previous year, whilst Mr. Brennan increased his by 6 lb. bringing it up to 100 lb. per acre, a very meritorious performance. The following list gives the names and addresses of those farmers whose yields were 70 lb. per acre or more.

Yields of 70 lb. Butterfat or more per acre.

	lb.		lb.
E. Rosher, Bassendean	157	A. Miller, Cowaramup	82
E. M. Webb, Cookernup	118	T. C. Cooper, Walpole	81
J. Pailthorpe, Armadale	108	B. P. Zimmerman, Torbay ..	79
M. Brennan, Balingup	100	A. Fisher, Rosa Glen	75
W. Middleton, Denmark	96	F. Pease, Torbay	75
V. R. Meager, Greenbushes ..	93	W. Pethwick, Byford	75
G. S Blaikie, Cowaramup ..	92	E. W. M. Trigwell, Donnybrook	74
J. Bashford, Northcliffe	87	J. Jarvis, Donnybrook	73
W. Della, Eastbrook	86	J. H. Bensted & Co., Dardanup	71
R. C. Benson, Kirup	85	A. C. Frost, Donnybrook ..	70
W. J. Bennetts & Son, Mt. Barker	85	G. White, Balingup	70
W. Dunne, Armadale	84	R. E. Dorrell, Manjimup ..	70

In Table XVIII below the stocking concentration and per acre output in each zone is compared. The data collected in the competition does not give any indications of a relationship between these two, but there does appear to be some relationship between cow and acre yield.

TABLE XVIII.

Production per Acre, 1949–50.

Zone.	Acres Utilised per Milch Cow.	Average Production of Butterfat per acre.
		lb.
Zone 1	4.6	52.0
Zone 2	4.1	59.4
Zone 3	5.0	48.0
Zone 4	5.0	45.9
Zone 5	4.7	52.4
Zone 7	4.5	51.5
All Zones	4.6	51.3

In general the figures from the judges disclose that where there is an upward trend in yield per cow, butterfat per acre also increases, where little new development is taking place. The case of Mr. Rosher has already been instanced earlier where in spite of more cows and higher yield per cow, production per acre dropped, due to new areas being brought into production that were not yet producing to capacity. It is obvious then that one of the easiest ways to increase acre yields and so total output is to strive for higher cow yields. When this objective has been obtained it is time enough to experiment with higher stocking concentrations. Many examples readily come to mind from Grade Herd Recording results where total output was largely increased from the same acreage by drastically reducing milking cow numbers.

TABLE XIX.

Herds over 250 lb. Fat per Cow and 100 lb. Fat per Acre.

Name.	Yield per acre.	Yield per Cow.	Acres per Cow Unit.
	lb. Butterfat.	lb. Butterfat.	
E. Rosher	157	278	1.8
M. Brennan	100	306	3.7

This table gives some information concerning the two farmers who produced 100 lb. or over per acre and more than 250 lb. per cow. It will be seen that the stocking concentration on the first farm is double that on the other, whilst production per acre is only half as much again.

Bulls.

Of a total of 102 bulls owned by all entrants 92 or 90 per cent. were pure bred, three of these being non-dairy type.

Particulars of distribution of breeds in the zones is shown in Table XX.

TABLE XX.

Breed of Bulls in Herds.

Breed.	Zone 1.	Zones 2, 3, 4, 5 and 7.	All Zones.
A.I.S.	20	14	34
Jersey	6	25	31
Guernsey	....	18	18
Friesian....	4	1	5
Grade	3	7	10
Red Poll	....	1	1
Aberdeen Angus	....	3	3

N.B.—Of the three grade bulls in Zone 1, two were in a herd which also had a pure bred bull.

UTILISATION OF SKIM MILK.

The measure of the efficiency of the use of skim milk was to determine the number of feeding months where calves and pigs were being reared. A maximum of 50 points was allotted in this section where 12½ feeding months per cow were obtained, based on the following schedule.

Each porker reared three feeding months.

Each calf reared five feeding months.

Each baconer reared five feeding months.

Each slip reared two feeding months.

Each weaner reared one feeding month.

For each feeding month below 12½ a deduction of four points was made.

In all zones for 2748 cows; 1382 calves and 3652 pigs including 176 cows were fed. In those herds where milk is produced for consumption as whole milk or for manufacture the position was 924 cows, 320 calves, 250 pigs including 18 sows. On the butterfat producing farms the figures were 1824 cows, 1062 calves, 3402 pigs including 158 sows. Table XXI below sets out the position in each zone—

TABLE XXI.

Utilisation of Skim Milk—Number of Calves and Pigs Fed.

Zone.	Cows.	Calves.	Pigs, excluding Sows.	Sows.	Total, Calves and Pigs.	Ratio, Calves and Pigs to Cows.
1	972	339	345	26	684	0.70
2	397	190	904	44	1,094	2.8
3	306	221	545	22	766	2.9
4	467	285	698	40	983	2.1
5	228	113	312	16	425	1.9
7	378	234	672	28	906	2.4
All Zones	2,748	1,382	3,476	176	4,858	1.8

Whole Milk Producers.—15 herds, 924 cows ; 320 calves ; 232 pigs, plus 18 sows.
Excluding Whole Milk Producers.—1,824 cows ; 1,062 calves ; 3,244 pigs, plus 158 sows.

From Table XXI it will be seen that slightly more than 50 per cent. of calves have been reared to "off the bucket" stage, in comparison to the number of cows. This is a pleasing state of affairs, as ample numbers are being reared for replacement and normal expansion of farming activities. Over 90 per cent. of the calves reared are heifer calves, consequently the figures in the table represent a heifer rearing of 45 per cent. of the total drop of calves. Under normal conditions 25 per cent. of heifers is ample to cover replacements due to culling, death, sales, etc., so the position in this regard is very sound. It is pleasing to see that a greater percentage of calves is being raised in Zone 1 which is predominantly a whole milk zone. Farmers in this area are more alive to the fact that good strong calves can be reared on a minimum quantity of whole milk, in some cases as low as 12 gallons, and thereafter raised on gruels, concentrates and good quality hay and pasture. This policy of rearing replacements is very much sounder than the more common one of buying in heifers or cows to keep up the herd strength.

Pig Raising.

This phase of operations on the butterfat producing farm is a very profitable sideline, particularly at the present time when prices for pig meats are so attractive, and it is surprising that more attention is not given in this direction.

Table XXII shows the relationship between the number of cows and the number of sows in each zone as a measure of the activity and interest in pig raising.

The number of sows in Zone 1 has always been lower than elsewhere, and the inclusion of those figures tends to distort the true picture in the butterfat areas. These are shown separately in the table. There is a very noticeable improvement in Zone 5, although a slight retrogression on butterfat farms taken as a whole. The average sales were slightly better than one bacon pig per cow milked, but this is far short of the suggested objective of two baconers per cow.

TABLE XXII.

Comparison of Number of Cows per Sow.

Zone	Cows	Sows	Number of Cows per Sow.						
			1949–50	1948–49	1935–36	1934–35	1933–34	1932–33	1931–32
1	972	26	37.4	608	22.8	23.6	34.5	....	....
2	397	44	9.0	11.2	11.7	10.2	10.7	....	....
3	306	22	13.9	9.2	6.2	6.9	15.9	....	....
4	467	40	11.7	12.9	8.6	10.9	11.2	....	....
5	228	16	14.2	48.0	9.7	11.6	10.6	....	....
7	378	28	13.5	11.4	....	8.4	12.3	....	....
All Zones	2,748	176	15.6	17.1	11.2	12.5	14.2	10.7	6.7
Butterfat farms only....	1,824	158	11.4	10.3	....	....	....	....	....

That this objective is easily obtainable where the necessary facilities are available on the average dairy farm is shown by the efforts of R. O. Briggs and W. Dunne in Zone 1.

In the case of Mr. Briggs a quota of whole milk is produced, any surplus being separated, the cream forwarded to a butter factory and the skim milk fed to calves and pigs. With a herd of 70 cows this farm carried 11 pedigree Berkshire sows and two pedigree Tamworth boars. During the twelve months period these sows farrowed twice giving 176 piglets reared, or an average of eight per litter. These were marketed as weaners, 98; porkers, 48; and baconers, 30.

Mr. Dunne on a property of only 52 acres carried 20 milking cows, the produce going to a butter factory. He has four sows of the Tamworth breed and a pure bred Berkshire boar. During the year he sold 58 pigs mainly as baconers, or an average of better than 2½ baconers per cow.

Other good returns in terms of baconers per cow are:—

B. W. H. Brett, Dardanup	Zone 2	36 cows	110 baconers
J. Jarvis, Donnybrook	Zone 2	20 cows	40 baconers
E. W. M. Trigwell, Donnybrook ..	Zone 2	36 cows	80 baconers
J. P. Norton, Capel	Zone 2	60 cows	247 baconers
J. A. D. Keall, Queenwood	Zone 2	21 cows	132 baconers
G. M. Smith and Sons, Jindong ..	Zone 3	71 cows	155 baconers
E. D. and H. S. Moyes, Bridgetown	Zone 4	29 cows	183 baconers
F. J. Smith, Mullalyup	Zone 4	32 cows	71 baconers
J. C. Williams, Bridgetown	Zone 4	33 cows	69 baconers
J. Bashford, Northcliffe	Zone 5	32 cows	76 baconers
J. J. Littlefair, Pemberton	Zone 5	27 cows	67 baconers
L. P. Joyce, Denmark	Zone 7	13 cows	80 baconers
E. Mullaly	Zone 7	22 cows	59 baconers
J. J. Joyce	Zone 7	15 cows	48 baconers
B. P. Zimmerman	Zone 7	29 cows	86 baconers

The breed of sows in use by competitors is shown in Table XXIII—

TABLE XXIII.

Breed of Sow.

Breed.	Number of Sows.				Percentage.			
	1949–50.	1948–49.	1935–36.	1934–35.	1949–50.	1948–49.	1935–36.	1934–35.
Berkshire	65	13	26	26	38.5	12.9	14	21
Berkshire × Tamworth	30	45	120	75	17.7	44.5	64	61
Tamworth	28	14	....	....	16.5	13.9	....	....
Large White	21	11	4	9	12.4	10.9	2	7
Large White × Berkshire	14							
Large Black	4							
Tamworth × Large Black	6	25	....	....	....	14.8	17.8	20	11
Other	1		18	38	14			

It will be seen that the Berkshire, Tamworth and their crosses are the most popular, with more interest being shown in the Large White Breed. This breed in general produces a longer side than the other breeds and the use of the Large White in crossing with the Berkshire and Tamworth is likely to produce a suitable bacon pig.

FARM MANAGEMENT.

In this section points are allotted for the layout of the property and in particular for the convenience and type of building being used for the handling of the herd and produce. Points are also allotted for the keeping of farm records.

There is a definite trend towards better farm layout in order to make better use of pastures, and also to greater convenience in dairy buildings and facilities, but lack of fencing materials, timber, cement, etc., is delaying progress in this regard. It is very pleasing however to note the greater attention being paid to a system of keeping records. The business of dairy farming is a complex one, and calls for an accounting and complete records if efficiency of management is to be maintained.

SUMMARY.

1. *Fodder Conservation.*

(a) The aim of providing 2½ tons of hay equivalent per milking cow has been proved desirable.

(b) Of the 83 competitors only 17 or slightly better than 20 per cent. conserved 2½ tons or more. With greater attention paid to this phase of the farming operations, production per cow and production per acre would quickly show an increase.

(c) It is suggested that to provide this 2 ½tons hay equivalent, hay, silage and summer fodders, or summer growing pasture be provided. This can be achieved by providing 1½ tons hay, 1½ tons of silage and ¼ acre of summer fodder or ½ acre of good summer growing pasture per milking cow.

(d) Early and thorough cultivation and seeding is essential to good yields for summer foders. Most farmers will find that crops such as Sudan grass, Japanese millet or sacchaline which can be grazed will suit their requirements better than maize or the sorghums, which require considerable labour in cutting, wilting and feeding.

2. *Pastures.*

(a) Carrying capacity of pastures can be largely improved by the incorporation of high yielding grass species such as Wimmera Rye, Perennial rye, Phalaris tuberosa and Kikuyu grass.

(b) Light cultivation of winter pastures early in the autumn has been proven profitable.

(c) Harrowing to spread animal droppings is desirable to give a more even and palatable growth.

(d) Top-dressing in the autumn at the rate of 2 cwt. per acre or at a slightly heavier rate in the lower south-western areas is economical.

(e) Carrying capacity appears to be best adjusted to 4 to 4½ acres per cow.

(f) Overstocking will not increase net profit.

3. *Dairy Herd.*

(a) High average production per cow is being obtained on some farms, and this is most desirable to enable higher output per acre and per labour unit.

(b) Early calving is practised by most entrants except those in the whole milk zones.

(c) Pure bred bulls are in general use, but still more discrimination could be shown in the choice of a sire, since many of those in use have no production backing.

4. *Pigs.*

(a) The number of baconers sold per cow is well below the objective of two. Some competitors are doing much better than this figure, and a generally increased interest is desirable.

(b) The Berkshire, Tamworth and Large White breeds are generally in use, and are found to produce suitable carcases.

5. *Farm Management.*

(a) Increasing interest is being shown in farm layout and convenience of dairy buildings and facilities.

(b) Shortages of materials is slowing up progress in this regard.

(c) The method of keeping farm records has improved generally.

6. *Utilisation of Skim Milk.*

(a) Skim milk is a valuable feeding stuff.

(b) Full use should be made of it to rear rather more heifers than are needed for herd replacement.

(c) After supplying the needs of calves the remaining milk should be used for rearing pigs.

SUMMARY OF DATA.

Number of competitors	83
Average size of herds (cows)	34.3
Average area of pasture per farm (acres)	159
Average area per milking cow (acres)	4.6
Average area per head of stock (acres)	2.5
Average per cow, lb. butterfat	237.6
Average yield per acre, lb. butterfat	51.3
Fodder conserved per cow:	
Hay (tons)	1.27
Silage (tons)	0.22
Summer crops (tons)	0.52
Equivalent as hay (tons)	1.52
Pigs—	
Ratio cows to sows:	
All zones	15.6
Butterfat farms	11.4

MURESK AGRICULTURAL COLLEGE.

W. Southern, B.Sc., Agric., Dip. Ed.

During recent years there has been a marked increase of interest in agricultural education.

The purpose of this article is to give primary producers and others information concerning Muresk Agricultural College.

The College was founded in 1926. It is Western Australia's counterpart of Hawkesbury, Roseworthy, Dookie and Gatton Agricultural Colleges.

Muresk was chosen on account of its suitability for mixed farming and for the convenience of its location.

In regard to the former consideration it is essential in an agricultural college that students may be trained in all branches of farming practice. Muresk is situated on the verge of the wheat belt; it has an assured rainfall, and its climatic conditions permit of operations being carried on in the cultivation of cereals, in fruit growing, in dairying, and in the growing of root and forage crops. Again, the district in which Muresk is situated is excellent stock country, and thus it is possible for students to receive instruction and practical experience in all branches of animal husbandry. From the point of view of adaptability it would be difficult to improve upon the location.

Convenience of position was the second consideration. The College is situated between Northam and York, nine miles from the former and fifteen miles from the latter towns. Muresk siding is three miles from Spencers Brook Junction, and sixty-three miles from Perth. The train service makes it possible to visit the College from Perth in the day. The College in its various activities is closely associated with the Department of Agriculture. It is a great advantage to have easy communication between the College and the capital city.

Dormitory No. 1

The College buildings stand on rising ground and command a noble view of the Avon Valley. The Avon River flows through the property, adding to its beauty and affording the students facilities for swimming. The surrounding country is undulating and well wooded. The average elevation of the College property is 600 feet above sea level. This altitude and the position of the College itself make the location a particularly healthy one.

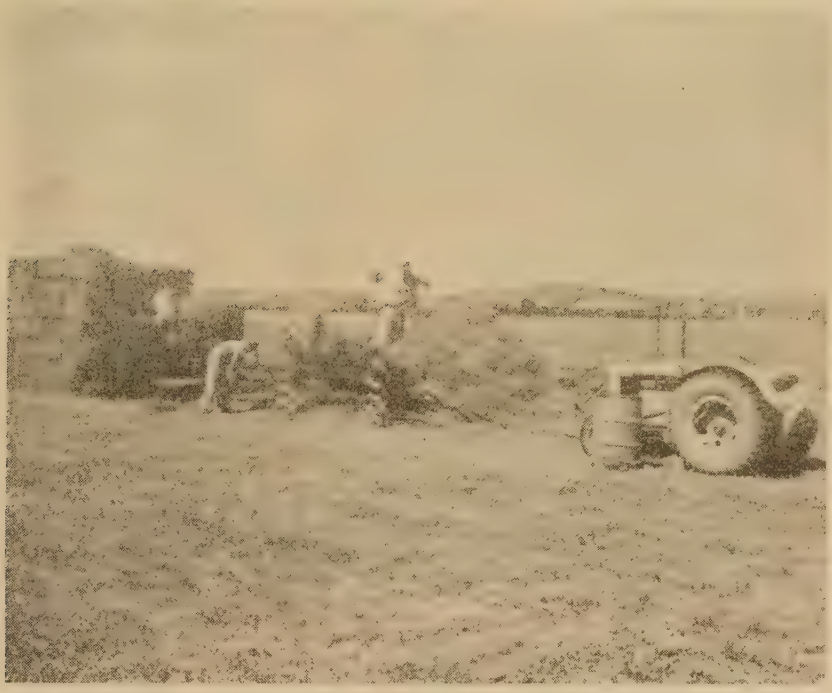
The Avon Valley is one of the oldest agricultural districts in the State, the first settlement having taken place within a decade of the foundation of the colony.

A complete building scheme has been designed and subsequent additions will conform generally to this plan. The College buildings at present consist of two dormitories, a science block, lecture rooms, a domestic block, and residences for members of the staff. In the dormitories each student has a separate room, and in the bathroms hot and cold showers and baths are installed. A large common room, a library and reading rooms, and a dark room are set apart for the use of students. Radios have been installed. The science block contains senior and junior laboratories and lecture room. An up-to-date gas plant is now in use in the laboratories. A carpentry shed and blacksmith's shop are provided in which technical instruction is given to the students. A modern butter and cheese factory fitted with the latest machinery and equipment is provided for students taking the Dairy Science Diploma course.

Semi-diesel engines have been installed in the power house to provide light and power for the College and workshops.

For its water supply the College is connected with the Goldfields Water Scheme. The septic tank system has been adopted for the treatment of sewage.

The College farm is 2,222 acres in extent. Part of the property is hilly and unsuitable for cultivation, but it affords good pasture. Wheat, oats, barley, and peas are grown, and in accordance with the rotation which obtains at the College certain of the paddocks are laid down to pasture, principally



Fodder Conservation.

subterranean clover. To provide green feed in summer for the dairy herd, pigs, and poultry, a plot has been laid down in lucerne under irrigation. For instructional purposes the College has a small orchard, vineyard, vegetable garden, and apiary.

The dairy herd consists of pedigreed Guernsey cattle, and is noted as being one of the finest herds of that breed in Australia. A piggery is conducted, the breeds represented being the improved Berkshire and the Tamworth. The foundation stock was imported from Great Britain, New Zealand and elsewhere. These are two of the leading herds in the State.

The sheep consist of Merino ewes run as a commercial flock, and Border-Leicester-Merino ewes are bred from these for mating with British breeds in connection with the raising of fat lambs for export and the local market.

In the poultry section the main breeds are the Australorp, White Leghorn, and Legbar. In addition to the College flock the State Egg Laying Trials are conducted at the College.

Silage Making.

The aims of the College, briefly enumerated, are:—

1. To train its students in the science of agriculture and farming practices, or in dairy factory work.

2. To raise the general standard of efficiency in farming by holding short courses of instruction for farmers.

3. To carry on research work.

4. To raise the standard of stock in the farming districts by breeding and distributing pure bred cattle, pigs, and poultry.

Admission of students—

1. Applicants must have attained the Junior Certificate (or equivalent standard) before admission may be granted.

2. Applications are received up to December 31st in each year. A selection is made as soon as the Junior Certificate results are available if the number of qualified applicants exceeds vacancies. Those who are applying for the "Western Mail" or a Departmental Scholarship must complete the whole application by November 30th.

Butter and Cheese Factory.

3. The application must include:—

(a) A completed application form.

(b) Two or more testimonials, including one from the applicant's headmaster.

(c) A medical certificate. (At any time a student may be required to submit himself for examination by the College Medical Officer to test his fitness for the work of the institution.)

(d) A statement by the student, giving general details of himself. This should include information concerning his school and out-of-school interests, etc.

Chemistry Laboratory.

Dining Room.

4. (a) Applicants who can furnish satisfactory evidence of having covered a course of work of a standard equivalent to that of the First Year Agricultural Course may be permitted to proceed direct to the Second Year of that Diploma Course, provided there is a vacancy in that year.

(b) Exemption from the first year and admission into the second year of the course for the Diploma in Dairy Science may be permitted by the Principal to applicants who are not less than 18 years of age and who—

(1) possess the Muresk Diploma in Agriculture; or

(2) possess certificates from approved colleges of a standard equal to that prescribed for the first year's students of this course; or

(3) (a) have worked for at least two years in an approved dairy produce factory, and who possess certificates under the Dairy Industry Act for testing and grading of milk and cream;

(b) have attained a standard of education approved by the Principal; and

(c) can produce a testimonial as to character and eligibility for the course from the manager of the factory in which they are employed and from the district dairy instructor.

Building Construction.

Students admitted to the course under paragraph 3, will be required, during the first term, to attend a course of lecturettes covering the curriculum for the first year and to pass an examination therein.

Where students for the Dairy Science Course are unable to conform fully to these entrance requirements, the Principal will consider applications on their merits.

5. Each student is admitted on probation for one term. If, at the end of that time, he proves to be unfitted for the College, he will not be permitted to return.

6. Parents and guardians of students will be required to give an undertaking that candidates will at all times conform to the rules and regulations of the College.

The fees charged are very low—in accordance with Government policy—being £60 per year for board and residence and approximately £15 per year for other charges.

Several scholarships are available for award each year.

Education Department Scholarships and allowances may be continued at the College and the "living-away-from-home" allowance of £40 per annum is available to students entitled to it.

The McCaughey Bequest and the Canteen Services Fund assistance apply to Muresk College students who come within the provisions of such assistance.

The College year is divided into two terms of twenty weeks each. The first term begins late in February and ends in July. The second term commences in August and concludes at Christmas.

Hay Cutting.

MURESK DIPLOMA IN AGRICULTURE (M.D.A.).

Lectures and demonstrations are given to the students in the lecture rooms and laboratories. Records are kept by the students of all work done in the classroom. A farm diary is kept showing the routine work of the year on the farm. Excursions are arranged from time to time to places of agricultural interest.

The course of study will extend over three years, and will have for its specific objective the Muresk Diploma in Agriculture (M.D.A.). The subjects taken during this course are set out in the Synopsis of Diploma Course.

In addition to theoretical and laboratory work, students in the Diploma Course must cover the full range of practical work. They take part in all field operations on the farm, and in the operations of the smithy and the workshops; they also gain experience in the breeding and management of stock. Their training covers the handling of teams and the use of the various implements and machinery, including the working of a tractor. In turn, the students spend time at farm work in the Dairy, the Piggery, the Poultry Section, the Garden and the Orchard, the Wool Shed and with the Sheep. Each student secures a thoroughly practical experience in Building Construction and Blacksmithing.

Students are engaged in class and farm work in alternate weeks.

MURESK DIPLOMA IN DAIRY SCIENCE (M.D.D.).

The course is of two years' duration.

The dairy factory contains accommodation in separate manufacturing rooms for butter and cheese making. It is equipped with dairy factory machinery of the latest design. Contained in the factory building are cold storage rooms which may be used for the storage of butter and for cheese.

A large and well equipped bacteriological laboratory is incorporated, which is used for the instruction of students in the course for the Muresk Diploma in Dairy Science, and for research or experimental work.

The factory is supplied with milk and cream from the College dairy herd, which consists of approximately 60 pure bred Guernsey cattle, augmented by purchase from selected sources.

Students at Muresk College secure all the advantages of a Secondary Residential College.

RECREATION.

Facilities are provided for sports, and general recreation committees are elected for the control of cricket, football, tennis, swimming, athletics, rifle shooting, gymnastics, etc. The Annual Sports Meeting is held on the Saturday prior to the Royal Show. A Swimming Carnival is held annually. The College is fortunate in the possession of a fine swimming pool.

For indoor recreation there are a billiard table, two reading rooms, a piano and radios. In the Assembly Room social gatherings are held from time to time.

Hobbies such as photography are encouraged, facilities being provided for them.

A technical and fiction library provides literature to meet the needs of students.

Facilities include a cinematograph (with sound track).

The College conducts a Savings Bank Agency, Book Store, Tuck Shop and Post Office.

The majority of students continue with farming pursuits. There are, however, many other avenues of employment open to graduates.

Those with a good academic qualification may proceed to the University in order to study for the Degree in Agriculture.

Further details concerning the College may be secured from the Principal, Muresk Agricultural College, Muresk, W.A., or the Department of Agriculture, Perth. The College is a sub-department of the Department of Agriculture.

BOOK REVIEW.

A new edition of the "Handbook for Woolgrowers" has been issued by the Australian Wool Board, of 416 Collins Street, Melbourne, as part of its service to the Australian sheep and wool industry. Forty thousand copies are being sent to growers throughout the Commonwealth and all growers who received copies of the first edition will automatically receive the 1950 publication.

Since the first edition was published in 1941, many major advances have taken place in pastoral research, and much of the information which has thus become available has been incorporated in the new issue.

The 1950 handbook covers a wide field, and deals not only with the parasitic, infectious, and nutritional diseases of sheep, but also with flock management, fleece characters, and pasture and poison plants.

It should provide a valuable reference book for those engaged in the sheep and wool industry.

STOCK FOODS.

The following Stock Foods have been registered with the Department of Agriculture under the Feeding Stuffs Act, 1928-1946, for the year commencing 1st July, 1950.

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	% Max.	%
A.—SIMPLE FOODS. 1.—*Meat Meals.*												
Meat Meal	10	COOGEE	Anchorage Butchers Pty., Ltd.	Waste meat products	36·9	18·6	1·3	1·0	12·73	12·5 / 8·0*	....	....
Do.	16	BROOME	The Westralian Farmers Co-op., Ltd.	Meat and bone	42·0	7·0	2·0	....	....	....	....	....
Do.	113	W.A.M.E.	Westralian Meat Export Works	Meat, bone and blood	45·0	13·0	2·0	....	12·0	11·0	....	....
Protein Meat Meal	137	CHAMPION	Sims Cooper (F.W.) Pty., Ltd.	Meat Works offal	50·0	15·0	5·0	....	....	....	....	....
Meat Meal	139	STATE ABATTOIRS, MIDLAND JUNCTION	State Abattoirs, Midland Junction	Animal offal and residues	52·0	15·0	2·0	....	3·98	3·44	....	....
Do.	140	WRIGHTS	Wrights, Limited	Animal waste and bone	40·0	11·0	1·5	....	14·0	....	....	....
Do.	155	N.A.	Westralian Farmers Co-op., Ltd.	Meat, bone and animal tissue	50·0	10·0	1·5	0·3	....	....	....	....
Whale Meat Meal	143	WEST AUSTRALIAN	do. do. do.	Whale offal	60·0	20·0	5·0	....	....	....	....	....
2.—*Meat and Bone Meals.*												
Meat and Bone Meal	17	VITA MEAL....	The Westralian Farmers Co-op., Ltd.	Meat and bone meal	40·0	9·0	2·0	....	....	....	....	....
Do. do.	71	S.M.P.	W. R. & N. N. Clarke	Meat and bone	50·0	13·0	2·0	....	....	....	....	....
Do. do.	70	ABERDEEN....	do. do. do.	do.	50·0	13·0	2·0	....	....	....	....	....
Do. do.	78	PENNELLS	C. A. Kirkby & Sons	do.	50·0	12·0	4·0	....	....	....	....	....
Do. do.	88	T. B. & S. (in diamond) No. 1	Thos. Borthwick & Son (Aust.), Ltd.	Animal offal	38·0	20·0	3·0	....	....	....	....	....
Do. do.	89	T. B. & S. (in diamond) No.2	do. do. do.	do.	50·0	20·0	4·0	....	....	....	....	....
Do. do.	90	T. B. & S. (in diamond), Brooklyn	do. do. do.	do.	50·0	12·0	4·0	....	....	....	....	....
Do. do.	93	KITCHENS	J. Kitchens & Sons Pty., Ltd.	Animal fat and bone	40·0	11·0	2·5	....	14·0	....	....	....
Protein and Bone Meal	136	IMPERIAL	W. Angliss & Co. (Aust.) Pty., Ltd.	Meat and bones	50·0	14·0	2·0	....	....	....	....	....
Meat and Bone Meal	141	TANGBROS	Wrights, Limited	Animal waste and bone	53·0	12·0	2·0	....	....	....		
Do. do.	142	PIONEER	do.	do. do.	40·0	....	2·0	....	....	....		
Meat Meal and Bone Meal	144	EXCELSIOR....	Barrow Linton & Co.....	Meat and bone	38·0	15·0	1·5	....	....	....		

3.—*Blood Meals.*												
Blood Meal	91	T. B. & S. (in diamond)	Thos. Borthwick & Son (Aust), Ltd.	Animal blood	75·0	5·0	5·0	....	....	....		
4.—*Liver Meal.*												
Liver Meal	135	IMPERIAL	W. Angliss & Co. (Aust.) Pty., Ltd.	Meat, bones and livers	65·0	22·0	....	....	....	....	....	....
5.—*Fish Meals.*												
Crayfish Meal ...	18	CRA-MEAL	The Westralian Farmers Co-op., Ltd.	Crayfish offal	32·0	0·5*	10·5	....	2·0	14·6	....	....
6.—*Milk Foods.*												
Dried Buttermilk Powder	77	SUNNYWEST	South-West Co-operative Dairy Farmers, Ltd.	By-product of butter manufacture	32·1	5·7*	....	....	....	....	....	....
Dried Buttermilk....	69	MAFFCO	W. R. & N. N. Clarke	do. do. do.	30·0	5·0*	....	....	....	....		
Krafco	115	KRAFCO	Kraft Walker Cheese Coy. Pty., Ltd.	Prepared from whey derived from milk in the manufacture of Cheddar cheese	10·0	0·5*	....	....	1·0	0·7	....	....
7.—*Wheat and Wheaten By-products.*												
Stock Meal	1	PEERLESS	Peerless Roller Flour Mills Pty., Ltd.	Crushed wheat	8·0	....	9·0	....	....	....	....	....
Do.	13	BORONIA	Boronia Flour Mills Pty., Ltd.	Wheat (whole)	8·0	....	5·0	....	....	....	....	....
Bran Meal	14	do.	do. do. do.	Wheat bran, pollard and/or wheat germ	12·5	1·5*	7·0	.	....	....		
Roller Bran ..	19	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Wheat	8·5	0·5*	9·0	....	....	....	....	....
Wheat Meal .	20	do.	do. do. do.	Wheat	8·5	1·0*	3·0	..	.	..	. .	....
Wheaten Meal .	39	BRANATO ..	W. Thomas & Co. (W.A.), Ltd.	Whea	8·0	....	10·0	. .	....	....	. .	....
Do.	40	"C" MEAL	do. do. do.	Wheat ..	8·0	..	10·0	. .	..	..	.	....
Do.	41	POLLATO ...	do. do. do.	Wheat	8·0		10·0					
Sub Bran	62	MILLERS ..	W. H. Milne & Co.	Crushed wheat .	8·0	.	9·0	.	.	.	.	....
Wheat Meal	63	do.	do. do. do.	do. . .	8·0	....	5·0	.	.	.	.	....
Stock Meal	64	do.	do. do. do.	do.	8·0	....	9·0	. .	.	. .	. .	....
Do.	85	YORK FLOUR MILLING CO.	The York Flour Milling Coy, Ltd.	Wheat	12·0	3·0*	7·0	...	...	....	..	....
Branato	86	YORK FLOUR MILLING CO., BRANATO	do. do. do.	do.	12·0	3·0*	7·5	. ..	. ..	. .	....	....
Pollato	87	YORK FLOUR MILLING CO., POLLATO	do. do. do.	do.	12·0	3·0*	7·0	....	....	....	....	....
8.—*Oil Seed Meals.*												
Pure Linseed oil Meal	102	MEGGITTS	Elder Smith & Co., Ltd.	Pure linseed from which proportion of the oil has been extracted by mechanical pressure	30·0	4·0*	10·0	..	....	....	....	....
Lin Meal	103	WESTERN	David Gray & Co., Pty., Ltd.	Linseed meal, yeast, malt, bone meal, pollard and limestone	20·0	7·0*	5·0	1·0 0·5*	....	0·8 0·5*		....

* Minimum. † When available.

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	%	%
B.—COMPOUND FOODS.												
1.—*Protein Meals.*												
Protein Meal "A"	21	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Meat meal, buttermilk, maize meal, †fish meal, calcium carbonate, salt, †manganese sulphate	35·0	8·0*	4·0	4·0 3·0*	....	4·0 3·0*	Mn Trace	....
Protein Meal "B"	22	do.	do do. do.	Meat meal, liver meal, bone meal, fishmea	35·0	7·0*	5·0	2·5 1·5*	....	7·0 5·0*	....	....
Quick Grow	43	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Meat meal, liver meal, milk powder, ground limestone, salt	30·0	12·5	5·0	8·0 5·0*	....	15·0 5·0*	....	....
Quick Lay	44	do.	do. do. do.	Meat meal, blood meal, liver meal and or fish meal, milk powder, ground limestone, salt	35·0	12·5	4·0	6·0 2·0*	....	15·0 10·0*	....	....
Egg Protein	45	do.	do. do. do.	Meat meal, blood meal, liver meal and or fish meal, ground limestone, salt	42·0	12·5	4·0	6·0 2·0*	....	15·0 10·0*	....	....
Protein Concentrate	145	EGGOLEEN	Barrow Linton & Co.	Meat meal, cereals and minerals	37·3	12·0	1·5	....	....	....	....	....
2.—*Cattle Food.*												
Sweetened Dairy Meal	23	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Wheat meal, bran, oat meal, linseed meal, pollard, molasses, bone meal, †malt combing, ground limestone, salt, blue stone	11·0	2·5*	6·0	1·0 0·5*	....	1·0 0·5*	Cu Trace	....
12% Protein Sweet Dairy Food	46	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Bran, pollard, wheaten meal, mill screenings, wheat germ, coconut meal and or malt combings, urea, bone meal, molasses, ground limestone, salt	12·0	1·5*	8·0	2·0 1·0*	....	4·0 1·75*	....	....
14% Protein Sweet Dairy Food	47	do	do. do. do.	Bran, pollard, wheaten meal, mill screenings, wheat germ, coconut meal and or malt combings, urea, bone meal, molasses, ground limestone, salt	14·0	1·5*	8·0	2·0 1·0*	....	4·0 1·75*	....	....

Cattle Food	72	EVE-LYN	Tropical Traders & Patersons, Ltd.	Linseed meal, pollard, salt, limestone, chalk, animal charcoal, molasses, sulphur, sulphate of iron, copper sulphate and medicinal herbs	5·0	3·0*	5·5	13·0 12·0*	3·7	9·5 8·5*	Sulphur 3·6	....
Sweet Dairy Food	106	WESTERN	David Gray & Co. Pty., Ltd.	Wheat meal, oat meal, barley meal, mill offal, linseed meal, flax meal, bone meal, yeast, malt, limestone, salt	12·0	3·0*	10·0	1·5 0·5*	....	0·8 0·5*	....	....
3.—*Calf Foods.*												
Calf Food	9	PARSONS	Parsons Bros. & Co. Pty., Ltd.	Wheat, oat branning, linseed, ground limestone, salt	12·0	2·0*	6·0	1·0	....	....		
Calf Meal	24	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Wheat meal, maize meal, barley meal, bran, pollard, †buttermilk, linseed meal, ground limestone, bone meal, salt, copper sulphate	13·0	3·5*	6·0	1·0 0·5*	.... ..	1·0 0·5*	Cu Trace	....
Calf Milk	48	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Buttermilk Powder, coconut meal, blood meal, pollard, ground limestone, salt	17·0	2·5*	6·0	1·5 0·5*	....	10·0 4·5*	....	....
Calf Food	49	do.	do. do. do.	Linseed meal and or coconut meal, pollard, ground limestone, salt	20·0	2·5*	8·0	3·0 1·0*	....	10·0 4·5*	....	....
Do.	73	EVE-LYN	Tropical Traders & Patersons, Ltd.	Wheat, pollard, linseed (whole), salt, sugar, chalk, sulphur, turmeric, sodium bi-carbonate, cream of tartar, foenugreek, ginger, coriander, copper sulphate (trace), bole armenian	8·5	3·0*	3·86	3·5 2·5*	.... ..	.... ..	Sulphur 1·75	....
Do.	80	HARPERS "STAR"	Robt. Harper & Co., Ltd.	Oats, linseed, maize, barley and rice meals and condiments	12·0	12·5*	7·0	....	....	....		
Do.	107	WESTERN	David Gray & Co. Pty., Ltd.	Pollard, linseed meal, milk powder, yeast, malt, bonemeal, limestone	20·0	7·0*	5·0	1·0 0·5*	....	0·8 0·5*	....	....
Do.	131	VETAMAC	A. H. McDonald & Co. ..	Wheat, pollard, maize meal, linseed meal, milk, sugar, mutton bird oil	15·35	7·5*	1·5	....	....	..	....	....
4.—*Sheep Foods.*												
Sheep Maintenance Cubes	25	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Oat meal, wheat meal, barley meal, linseed, †coconut meal, bone meal, molasses, salt and minerals, ground limestone	14·0	3·0*	7·5	3·0	..	1·0 0·5*	....	....
Sheep Breeder Cubes	156	do.	do. do. do.	Oat meal, wheat meal, barley meal, linseed and coconut meals, bone meal, molasses, salt, limestone	18·0	3·0*	7·5	0·5* 1·0	..	0·5* 1·0	....	....
Sheep Food	74	EVE-LYN ..	Tropical Traders & Patersons, Ltd.	Linseed meal, pollard, salt, limestone, chalk, animal charcoal, molasses, sulphur, sulphate of iron, copper sulphate, medicinal herbs	5·0	1·0*	5·0	13·5 12·5*	3·7	9·6 8·6*	Sulphur 3·6	....

* Minimum. † When available.

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	%	%
Maintenance Sheep Nuts	104	WESTERN	David Gray & Co. Pty, Ltd.	Linseed meal, yeast, malt, bone-meal, wheat meal, limestone, salt, trace elements	15·0	3·0*	7·0	1·5 0·5	....	0·8 0·5*	....	....
Ewe and Lamb Nuts	105	do.	do. do. do.....	Linseed meal, yeast meal, malt, wheat meal, bone meal, wheat germ, limestone, salt, trace elements	20·0	5·0*	5·0	1·5 0·5*	....	0·8 0·5*	....	...
5.—*Poultry Foods.*												
Poultry Mash	2	CAPITOL	The Maylands Milling Coy Pty., Ltd.	Bran, pollard, wheat meal, oat pollard, meat meal, bone meal, limestone, salt	14·0	3·5*	5·0	1·0		2·5	. .	.
Laying Mash, No. 1	3	CAPITOL	The Maylands Milling Coy. Pty., Ltd.	Bran, pollard, wheat meal, meat meal, bone meal, limestone, salt	15·0	3·5*	5·0	1·0	.	3·5	.	. .
Growers Mash ...	26	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Wheat meal, pollard, oat meal, bran, †buttermilk, meatmeal, salt, ground limestone	13·0	4·0*	7·5	1·0 0·5*	. .	1·0 0·5*	. .	..
Growers Pellets	27	RED COMB	do. do. do.	Wheat meal, pollard, oat meal, bran, †buttermilk, meat meal, salt, ground limetsone, †fish meal	13·0	4·0*	7·5	1·0 0·5*	....	1·0 0·5*	. .	....
Laying Pellets, No. 1	28	do.	do. do. do.	Wheat meal, bran, oat meal, pollard, meat meal, †buttermilk, ground limestone, salt, fish meal, liver meal	14·0	4·0*	7·0	1·0* 0·5*	....	1·0 0·5*	....	....
Laying Mash, No. 1	29	WESFARMERS	do. do. do.	Wheat meal, bran, oat meal, pollard, meat meal, †buttermilk, ground limestone, salt	14·0	4·0*	7·0	1·0 0·5*	....	1·0 0·5*	....	....
Poultry Fattening Mash	30	do.	do. do. do.	Barley meal, wheat meal, pollard, oat meal, bran, †buttermilk, †fish meal, ground limestone, salt	13·0	2·5*	6·0	1·0 0·5	....	1·0 0·5*	. .	....
Special Laying Mash	50	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Bran, pollard, wheat meal, mill screenings, liver meal, ground limestone, salt	14·0	2·5*	7·0	1·5 1·0*	. .	3·75 2·5*	.	. .
16% Protein Laying Mash, No. 1	51	do.	do. do. do.	Bran, pollard, wheat germ, wheaten meals, mill screenings, meat meal, blood meal and or liver meal, ground limestone, salt	16·0	2·5*	6·0	2·0 1·0*	....	3·75 2·5*	....	....

20% Protein Laying Mash	52	do.	do. do. do.	Mill offal, mill screenings, wheat germ and or wheat meal, dried blood, liver meal and or fish meal, meat meal, ground limestone, salt	20·0	2·5*	6·0	{2·0 1·0*	....	3·75 2·5*	....	....
Fattening Mash	53	do.	do. do. do.	Bran, pollard, wheat meal and or wheat germ, meat meal, pea meal, milk powder, ground limestone, salt	13·0	2·0*	6·5	{1·5 1·0*	....	3·75 2·0*	....	....
Laying Mash, No. 1	65	MILLERS	W. H. Milne & Co	Bran, pollard, wheat meal, grist oats, meat meal, bone meal, limestone, salt, oyster flour	15·0	{6·0 4·0*	}5·5{	1·5 0·75*	2·0 1·0*	4·0 3·0*	....	....
Fattening Mash	66	do.	do. do.	Bran, pollard, wheat meal, grist oats, meat meal, bone meal, oyster grit, salt, limestone	13·0	{6·0 4·0*	}6·0{	1·75 1·0*	3·0 2·0*	3·5 2·0*	....	....
Poultry Mash	79	K. B.	C. A. Kirkby & Sons	Wheat, meat and bone meal, salt, bran, pollard, oyster flour	13·0	3·45*	7·0	1·0	1·21	2·0	..	....
Egg Milk	42	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Buttermilk powder, albumen milk powder, pollard, ground limestone, salt	18·0	8·0*	4·0	{3·5 2·0*	....	15·0 5·0*	....	....
Laying Mash	94	MORLAY	R. B. Young	Wheat meal, bran, pollard, meat meals, bone meal, ground limestone, minerals	14·0	3·0*	5·5	{2·0 0·75*	....	4·0 2·0*	..	....
"D" Mash (Fattening)	95	do.	do.	Wheat meal, bran, pollard, meat-meals, bone meal and minerals	10·5	3·0*	5·0	{1·5 0·5	....	4·0 2·0*	....	....
Growing Mash	96	do.	do.	Wheat meal, bran, pollard, meat meal, bone meal, limestone, ribon, minerals	15·5	3·0*	5·5	{2·0 0·75	....	5·0 2·5*	....	....
Growing Allmash	97	do.	do.	Wheat meal, bran, pollard, meat meal, bone meal, limestone, ribon, minerals	12·0	3·0*	6·0	{2·0 0·75*	....	4·75 2·0*	....	....
Laying Allmash	98	do.	do.	Wheatmeal, bran, pollard, meat meal, bone meal, limestone, minerals	13·0	3·0*	6·0	{2·0 0·75	....	4·0 2·0*	....	....
A1 Laying Mash	108	WESTERN	David Gray & Co. Pty., Ltd.	Mill offal, wheat meal, yeast, meat meal, fish meal, lime stone	14·0	3·0*	5·0	....	....	{1·5 0·5	....	....
Laying Mash, "B"	109	do.	do. do.	Mill offal, wheat meal, yeast, bone meal, linseed meal, limestone	12·5	2·5*	5·0	....	....	{1·5 0·5*	....	....
Growing Mash	146	GROWELL	Barrow Linton & Co.	Bran, pollard, wheat meal, oat pollard, meat meal, limestone, salt, wheat germ	14·0	4·5*	4·5	1·0	....	3·0	....	....
Laying Mash	147	EGGLAYER	do. do.	Bran, pollard, wheat meal, oat pollard, meatmeal, salt, bone meal, shellgrit	15·0	3·5*	5·0	1·0	....	3·5	....	....
Fattening Mash	148	DUKKO	do. do.	Bran, pollard, wheat meal, oat pollard, bone meal, salt, ground limestone	10·0	4·0*	4·0	1·0	....	3·0	....	....
Growing Mash	153	CAPITOL	The Maylands Milling Co. Pty., Ltd.	Bran, pollard, wheat meal, oat pollard, meat meal, bone meal, shellgrit, salt, riboflavin, emulsified fish oil	15·0	3·5*	5·0	1·0	....	3·5	....	....

* Minimum. † When available.

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	%	%
Special Laying Mash	154	CAPITOL	The Maylands Milling Co., Pty., Ltd.	Bran, pollard, wheat meal, oat pollard, meat meal, bone meal, shellgrit, salt	17·0	3·5*	5·0	1·0	....	3·5*	....	....
6. *Chick Foods.*												
Chick Food	15	W.A.P. APEX	W.A. Produce Co.	Wheat, maize, peas, oats, shell grit	10·0	3·0	6·5	....	....	....	....	....
Chick Pellets " A "	31	RED COMB	The Westralian Farmers Co-op., Ltd.	Wheat meal, pollard, bran, oat meal, maize meal, ground lime stone, manganese sulphate, salt, †vitaminised fish oil	15·0	4·0*	7·0	Trace	....	Trace	....	....
Chick Pellets " B "	32	do.	do. do. do.	Wheat meal, oat meal, pollard, bran, maize meal, †butter milk, meat meal, ground lime stone, salt, vitaminised fish oil	14·0	4·0*	7·0	1·0 0·5*	....	1·0 0·5*	....	....
Chick Mash " A "	33	WESFARMERS	do. do. do.	Wheat meal, oaten meal, pollard, bran, †buttermilk, meat meal, liver meal, maize meal, ground lime stone, manganese sulphate, salt, vitimanised fish oil,	15·0	4·0*	7·0	Trace	....	1·0	....	....
Chick Mash " B "	34	do.	do. do. do.	Wheat meal, oaten meal, pollard, bran, maize meal, †butter milk, meat meal, ground lime stone, salt, vitaminised fish oil	14·0	4·0*	7·0	1·0 0·5*	....	1·0 0·5*	....	....
Chicken Milk No. 1	54	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Milk powder, meat meal, liver meal, blood meal, bone meal, pollard, ground lime stone, salt	25·0	1·5*	4·0	3·5 2·0*	....	15·0 7·5*	....	....
Chicken Milk No. 2	55	do.	do. do. o.	Butter milk powder, albumen milk powder, bone meal, pollard, ground lime stone, salt	20·0	1·5*	4·0	3·5 2·0*	....	15·0 7·5*	....	....
Chicken Grain	56	do.	do. do. do.	Wheat, maize, peas, shell grit	9·0	1·5*	4·5	....	....	....	....	....
Chick Grower	57	do.	do. do. do.	Bran, pollard, wheaten meal, wheat germ, meat meal, liver meal, milk powder, pea meal, ground lime stone, salt	14·5	2·5*	6·0	1·5 1·0*	....	3·75 2·5*	....	....
Chick Starter	58	do.	do. do. do.	Bran, pollard, wheaten meals, wheat germ, meat meal, liver meal, blood meal, fish meal, milk powder, pea meal, and/or maize meal, lucerne meal, coconut meal, ground limestone, salt, cod liver oil	18·0	2·5*	6·0	0·5* 1·0	....	1·0* 2·5	....	....

Do.	67	MILLERS	W. H. Milne & Co.	Bran, pollard, wheat meal, maize meal, meat meal, whey powder, oyster flour, bone meal, oat meal, salt, cod liver oil	16·0	{6·0 4·0*	5·5	{1·5 0·75*	2·0 1·0*	3·0 2·0*	....	....
Chick Builder	68	do.	do. do. do.	Bran, pollard, wheat meal, cod liver oil, maize meal, bone meal, gristed oats, salt, whey powder, oyster flour	15·0	{6·0 4·0*	5·5	{1·5 0·75*	2·0 1·0*	3·5 2·5*	....	....
Chick Food	92	ANCHOR	G. Wood Son & Co., Ltd.	Wheat, oats, barley, peas, maize, meat meal, bone meal, oyster grit, linseed, milk powder	13·0	2·5*	3·0	....	1·73	2·0	....	....
Chick Allmash	99	MORLAY	R. B. Young	Wheat meal, bran, maize meal, meat meal, milk powder, bone meal, oyster grit minerals, ribon	12·5	3·0*	6·0	{1·75 0·75*	....	4·0 2·0*	....	....
Chick Starter	100	do.	do. do.	Wheat meal, bran, maize meal, meat meal, milk powder, bone meal, oyster grit minerals, vitaminised oil, ribon	16·0	3·0*	5·5	{1·75 0·75*	....	4·0 2·0*	....	....
Do.	110	WESTERN	David Gray & Co. Pty., Ltd.	Mill offal, maize meal, wheat meal, milk powder, meat meal, yeast, fish liver oil, calcium carbonate	14·0	4·0*	5·0	....	....	{0·8 0·5*	....	....
Chick Builder	111	do.	do. do.	Mill offal, maize meal, wheat meal, milk powder, meat meal, bone meal, yeast, fish liver oil, calcium carbonate	13·5	4·0*	5·0	....	....	{0·8 0·5*	....	....
Chick Grain	112	do.	do. do.	Maize, wheat, peas, oats, kalo, oyster grit	8·0	3·0*	10·0	....	....	3·0	....	....
Chick Food	128	H & C	Haynes & Clements	Wheat, maize, peas and grit	9·0	1·5*	4·5	....	....	1·0*	....	....
Chicken Meal	130	ROYAL SEAL	J. & W. Bateman Pty., Ltd.	Wheat, pannicum seed, Peas, maize, shell grit	10·0	2·0*	4·0	....	....	....	....	....
Chick Mash	149	VITALIZER	Barrow Linton & Co.....	Bran, pollard, wheat meal, oat pollard, wheat germ, meat meal, milk powder, salt, ground limestone, oil	15·0	4·0*	4·5	1·0	....	3·0	....	....
Grain Food	150	CHIC-CHIC	do. do.	Wheat, oats, maize, peas	9·0	2·27*	5·0	....	....	....	....	....
Chick Starter	151	CAPITOL	Maylands Milling Co. Pty., Ltd.	Bran, pollard, wheat meal, oat pollard, meat meal, bone meal, shellgrit, salt, riboflavin, emulsified fish oil	16·0	3·5*	5·0	1·0	....	3·5*	....	....
Special ChickStarter	152	do.	do. do. do.	Bran, pollard, wheat meal, oat pollard, meat meal, bone meal, shellgrit, salt, riboflavin, emulsified fish oil	17·0	3·5*	5·0	1·0	....	3·5*	....	....
7. *Pig Foods.*												
Pig Starter	59	THOMAS	W. Thomas & Co. (W.A.), Ltd.	Bran, pollard, wheaten meal, meat meal, blood meal, liver meal, bone meal, ground limestone, salt	15·5	2·5*	6·5	{2·0 1·0*	....	{4·5 2·5*	....	....
Pig Grower	60	do.	do. do. do.	Bran, pollard, wheaten meal, meat meal, blood meal, ground lime stone, salt	14·5	2·5*	6·5	{2·0 1·0*	....	4·5 2·5*	....	....

* Minimum. † When available.

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	%	%
Pig Food	75	EVE-LYN	Tropical Traders and Patersons, Ltd.	Pollard, linseed meal, salt, lime stone, chalk, sulphur, animal charcoal, sulphate iron, limonite, copper suphate, medicinal herbs	5·0	1·0*	5·0	{9·75 / 8·75*	3·5	{9·5 / 8·5*	Sulphur 4·5	....
8.—*Horse Foods.*												
Horse Food	76	EVE-LYN	Tropical Traders and Patersons, Ltd.	Pollard, linseed meal, linseed (whole), wheat, salt, chalk, magnesium sulphate, sulphur, sulphate iron, copper sulphate, sodium bi-carbonate, medicinal herbs	8·5	3·0*	7·0	{6·5 / 5·5*	0·9	{1·75 / 0·75*	Sulphur 2·5	....
9.—*Dog Foods.*												
Charcoal Shapes	4	SNAPS	A. E. Robinson	Wheat, bone, meat, vegetable, charcoal	14·0	3·0*	6·0	....	{3·0 / 2·0*	3·0 / 2·0*	....	....
Puppy Meal	5	do.	do. do. do.	Wheat, bone, meat, vegetable	15·0	4·0*	2·0	....	{4·0 / 3·0*	4·5 / 3·5*	....	....
Plain Shapes	6	do.	do. do. do.	do. do. do.	15·0	4·0*	2·0	....	{4·0 / 3·0*	4·0 / 3·0*	....	....
Puppy Biscuits	7	do.	do. do. do.	do. do. do.	15·0	4·0*	2·0	....	{4·0 / 3·0*	4·5 / 3·5*	....	....
No. 1 Dog Biscuits	8	do.	do. do. do.	do. do do.	15·0	4·0*	2·0	....	{4·0 / 3·0*	4·5 / 3·5*	....	....
C.—STOCK LICKS.												
1.—*Mixed Stock Licks.*												
Stock Lick	35	WESFARMERS	The Westralian Farmers Co-op., Ltd.	Salt, calcium carbonate, bone meal, bluestone, cobalt chloride, manganese sulphate, iron sulphate	....	....	....	80·0	0·85*	8·4*	....	....
Di-Calcic Lick	36	do.	do. do. do.	salt, di-calci phosphate	....	....	....	60·0	15·0*	11·0*	....	....
Denmark Lick Substitute	37	do.	do. do. do.	Limonite, salt, copper sulphate	....	....	....	65·0	....	....	....	Iron 10·0
Do. do.	81	C.S.M.L.	Cuming-Smith & Mt. Lyell F.F., Ltd.	Limonite, sulphate copper, salt	....	....	....	38·0	....	....	V.T. F.E. 20·0	....
C.S.M.L. Copper Lick	82	do.	do. do. do.	Di-calcic phosphate, copper sulphate, salt	....	....	....	66·0	12·5*	....	....	....
Di-calcic Lick	83	do.	do. do. do.	Di-calcic phosphate, salt, molasses	....	....	....	38·0	18·0*	13·0*	Molasses. 5·0	....
Di-calcic Phosphate	84	do.	do. do. do.	Calcium phosphate, at least 90 per cent. of the P_2O_5 being as di-calcic phosphate	....	....	....	....	37·0*	28·0*	....	....

Salt Lick	101	LEPP	J. S. Corden & Co. (Vic.) Pty. Ltd.,			Commercial salt	....	....	....	100·0	....	....	.... Min. Sulphur.	.... Min. Iron.
Cobaltised and Copperised Concentrated Sheep Lick "D"	116	VITA LICK	Goldsbrough, Mort & Co. Ltd.,			Bone flour (degelatinised), bone charcoal, sodium sulphate (anhydrous), sulphur, limonite, potassium iodide, copper sulphate, cobalt chloride, and meals derived from the by-products of rice, cocoa and wheat	....	....	....	....	23·5*	30·0*	2·0	1·3
Cobaltised and Copperised Sheep Lick Mixed "D"	117	do.	do.	do.	do.	do. do do.	....	....	....	80·0	3·7*	4·7*	0·32	0·18
Cobaltised and Copperised Concentrated Sheep Lick "G"	118	do.	do.	do.	do.	Bone flour (degelatinised), bone charcoal, limonite, flowers of sulphur, potassium iodide, copper sulphate, cobalt chloride, and meals derived from by-products of rice, cocoa and wheat	....	....	....	....	23·5*	31·0*	4·0*	3·52*
Cobaltised and Copperised Sheep Lick Mixed "G"	119	do.	do.	do.	do.	do. do. do.	....	....	....	80·0	3·8*	4·9*	0·64*	0·56*
Cobaltised and Copperised Cattle Lick Concentrated "D"	120	do.	do.	do.	do.	Bone flour (degelatinised), bone charcoal , sodium sulphate (anhydrous), flowers of sulphur, potassium iodide, copper sulphate, cobalt chloride, and rice, cocoa and wheat meals, limonite	....	....	....	....	21·2*	29·0*	0·4*	3·4*
Cobaltised and Copperised Cattle Lick Mixed "D"	121	do.	do.	do.	do.	Bone flour (degelatinised), bone charcoal, sodium sulphate (anhydrous), flowers of sulphur, potassium iodide, copper sulphate, cobalt chloride, and rice, cocoa and wheat meals	....	....	....	75·0	4·2*	5·4*	0·08*	0·64*
Cobaltised and Copperised Cattle Lick Mixed "G"	122	do.	do.	do.	do.	do. do. do.	....	....	....	75·0	4·4*	5·8*	0·22*	0·88*
Cobaltised and Copperised Cattle Lick Concentrated "G"	123	do.	do.	do.	do.	Bone flour (degelatinised), bone charcoal, limonite (anhydrous), flowers of sulphur, potassium iodine, copper sulphate, cobalt chloride, and rice, cocoa and wheat meals	....	....	....	....	24·5*	31·0*	1·15*	4·7*
Kaf-o-vite	124	KAF-O-VITE	do.	do.	do.	Rice meal, barley meal, wheat pollard, linseed meal, bone charcoal, calcium carbonate, cane sugar	16·5	....	....	....	0·8*	1·5*	....	....

* Minimum. † When available.

STOCK FOODS—*continued.*

Stock Food.	Reg. No.	Brand.	By whom Registered.	Materials from which Made.	Registered Analysis.							
					Crude Protein.	Crude Fat.	Crude Fibre.	Sodium Chloride.	Phos. Acid (P_2O_5).	Lime (Ca).	Other.	
					% Min.	% Max.	% Max.	% Max.	% Max.	% Max.	%	%
Vita Lick Mineral Mixture	125	V.M.M.	Goldsbrough Mort & Co., Ltd.	Bone flour (degelatinised), bone charcoal, Spanish iron oxide, ferrous sulphate, flowers of sulphur, sodium sulphate (anhydrous), and meals derived from rice and cocoanut	....	....	....	4·3	9·5*	12·5*	1·4*	0·47*
Por-co-vite	126	POR-CO-VITE	do. do. do.	Bone flour (degelatinised), bone charcoal, sodium sulphate (anhydrous), flowers of sulphur, sodium chloride, limonite, calcium carbonate, copper sulphate, cobalt chloride, potassium iodide, cod liver oil	....	....	....	14·0	19·1*	30·0*	9·7*	0·62*
Chic-a-vite	127	CHIC-A-VITE	do. do. do.	Bone flour (degelatinised), bone charcoal, ferrous sulphate, flowers of sulphur, sodium sulphate (anhydrous), gentian, cod liver oil, potassium iodide, and meals derived from by-products of rice	....	....	....	....	20·7*	27·6*	1·8*	1·8*
Mineral Concentrate	132	VETSOLICK....	A. H. McDonald & Co.	Magnesium sulphate, sodium bicarbonate, carbo-ligni, pollard, sulphate of iron, sulphur, potassium iodide, bone meal	....	....	....	....	11·0*	14·0*	Sulphur. 16·6	Iron. 1·5
Medicated Lick	133	VETAMAC	do. do. do.	Salt, sulphate of iron, sodium bicarbonate, aloes, sulphur, magnesium sulphate, bone meal, molasses, potassium iodide	....	....	....	53·0	5·7*	7·5*	4·0	0·7
Coast Compound....	134	do.	do. do. do.	Pollard, sulphate of iron, sodium bicarbonate, sulphur, carbo-ligni, cobalt chloride, copper sulphate, aniseed, molasses	....	....	....	....	....	Copper Sulphate. 1·6	Sulphur. 12·0	Iron Sulphate. 8·0
2.—*Bone Meals.*												
Bone Meal	11	ANCHO	Anchorage Butchers Pty., Ltd.	Waste meat products	23·63	2·44*	....	....	26·76*	26·95*	....	....

Sterilised Bone Flour	12	TRI-CAL-OS	Davis Gelatine (Aust.) Pty., Ltd.	Bones	5·0	....	....	....	30·0*	40·0*	....	....
Sterilised Bone Grit Meal	38	N.A.	The Westralian Farmers Co-op. Ltd..	do.	20·0	....	....	....	22·0*	26·0*	....	....
Do. do.	61	Newcastle N.A.	W. Thomas & Co. (W.A.), Ltd .	do.	20·0	8·0*	1·0	....	20·0*	10·0*	....	....
Bone Meal	114	WAME	Westralian Meat Export Works	do.	18·75	....	....	·25	26·0*	27·0*	....	....
Do.	129	WATTLE	Wattle Fertiliser Co.	do.	16·0	5·0	....	....	22·5*	30·0*	....	....
Do.	138	F.P.L. ALL-BONE	Fergusons Pty., Ltd.	do.	18·0	....	....	1·0	27·0*	34·0*	....	....

* Minimum. † When available.